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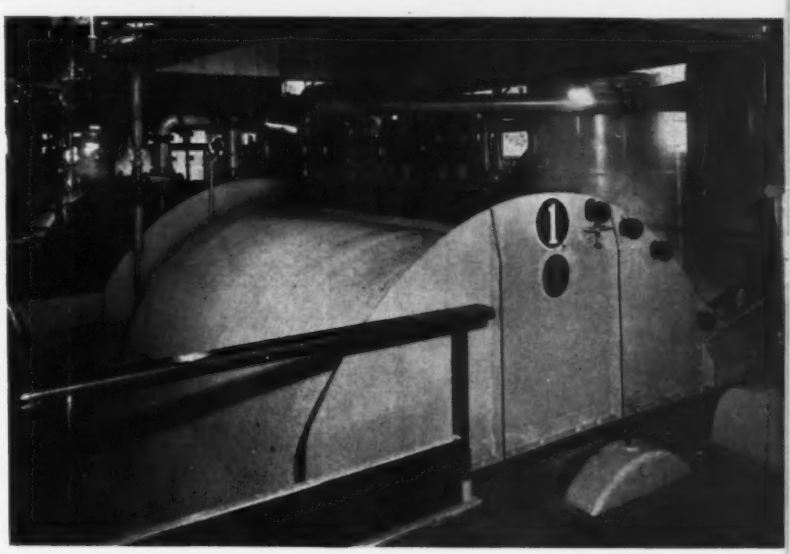
Paper TRADE JOURNAL

REG. U. S. PAT. OFF.

VOLUME 124, No. 23 JUNE 5, 1947

Pulp Washing in a Closed System



Are you losing valuable chemicals to the sewer?

Then investigate the Swenson-Nyman Pulp Washer which operates as a completely closed system and permits the escape of only the residual chemicals contained in the washed sheet —as low as 20 to 50 pounds per ton of pulp.

Are your steam costs too high?

Then you will be interested in how much less dilution there is with a Swenson-Nyman System —how it brings important reductions to evaporator loads.

Do you have trouble with foaming, backwashing, channeling?

Let us explain how Swenson-Nyman multi-stage countercurrent washing has been engineered to overcome these difficulties . . . how multiple units provide 3, 4, 5, and 6-stage operation . . . how it has brought increased efficiency in the manufacture of wood pulps. Write for Bulletin F-104.

SWENSON

SWENSON EVAPORATOR COMPANY

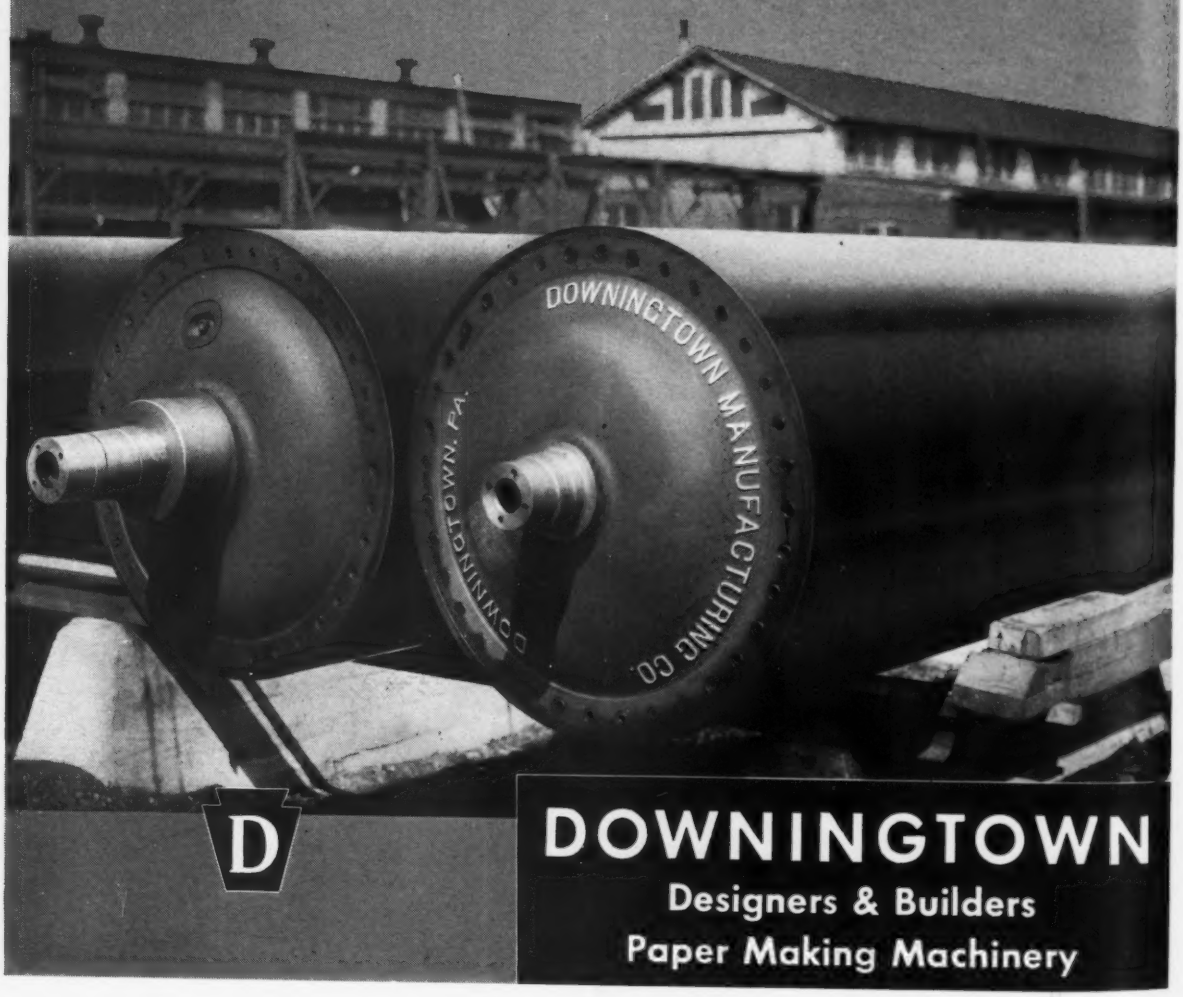
Division of Whiting Corporation
15687 Lathrop Avenue, Harvey, Ill.
Export Dept.: 136 Liberty Street
New York 6, N. Y.

75th ANNIVERSARY

KRAFT PULP DECKERS • BLACK LIQUOR EVAPORATORS • LIME SLUDGE FILTERS • BLOW CONDENSERS

WHAT'S DIFFERENT ABOUT THESE DRYERS?

At first glance they may look like any other dryer rolls. But look closely at the ends, front and back. Notice the Streamlined S-M-O-O-T-H-N-E-S-S. No projecting bolt heads. Recessed hand hole cover plate. Nothing to catch onto a cleaning rag. We believe these are the "World's Easiest to Keep Clean." This is typical of the numerous improvements and refinements in post-war Downingtown Paper Making Machinery . . . Downingtown Mfg. Co., Downingtown, Pa.



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DOWNINGTOWN
Designers & Builders
Paper Making Machinery

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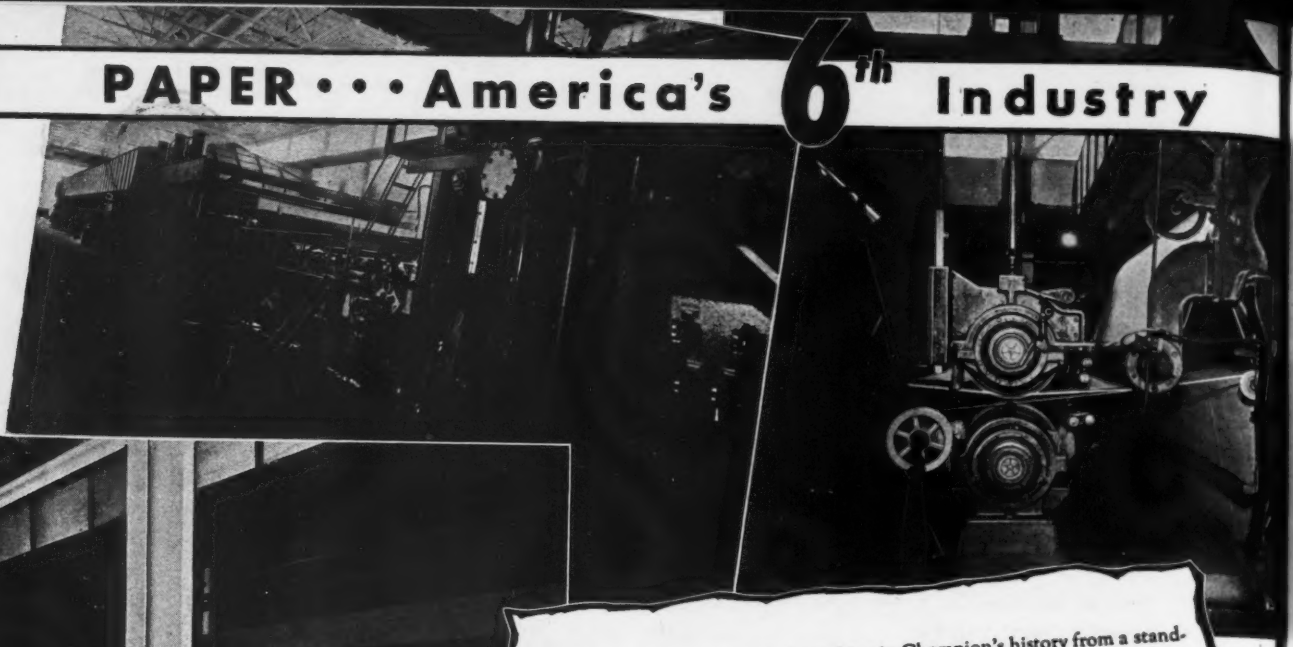
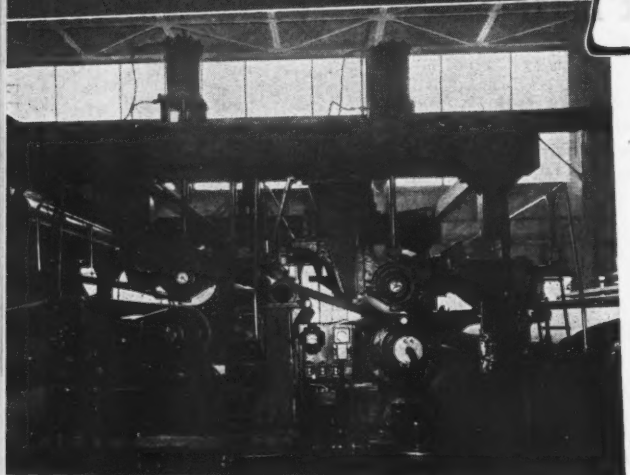
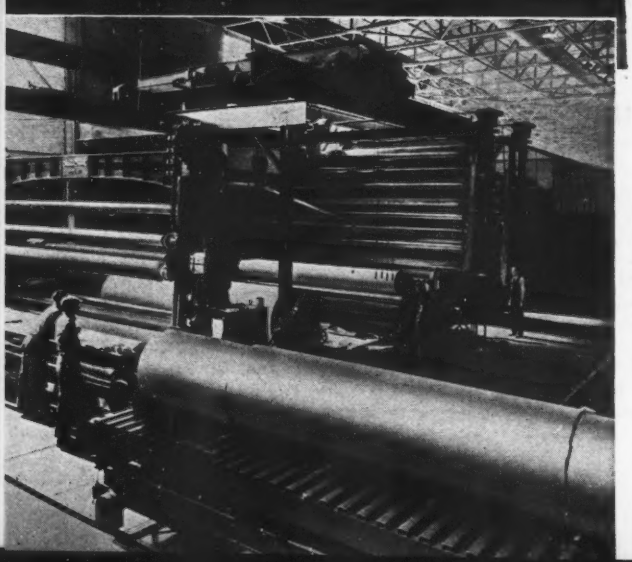
PAPER • • • America's 6th Industry







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Established 1848. Builders of Paper-Making Machinery

Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

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ROBERT S. ARIES

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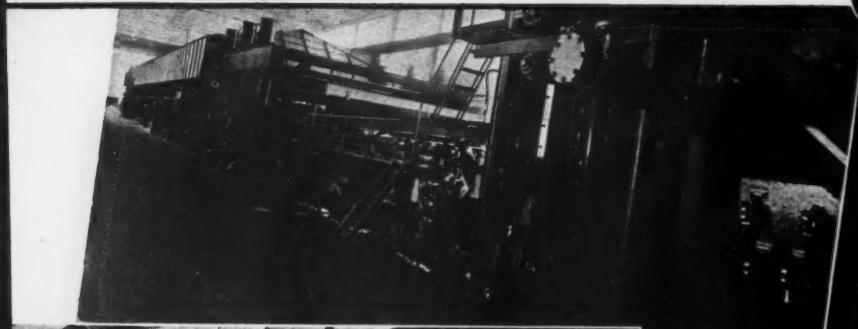

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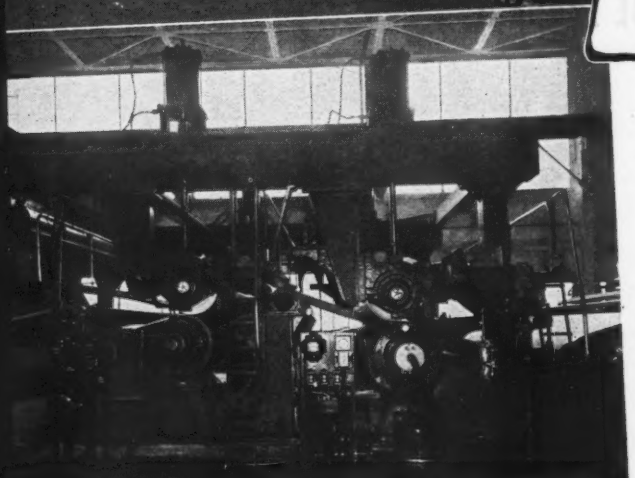

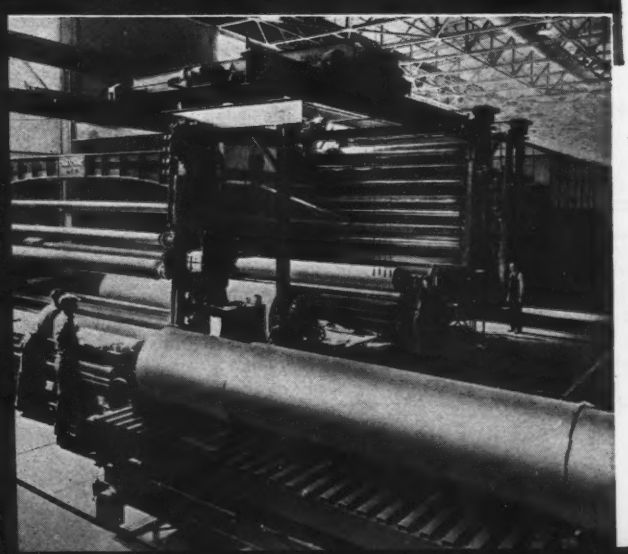

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ROBERT S. ARIES

Harrington Retires; Dunbar Succeeds Him

HOLYOKE, Mass. — Thomas E. Harrington has retired as sales manager of the Crocker McElwain Co. because of poor health. He is taking an indefinite leave of absence but will continue on with the local paper company in an advisory capacity. Edson S. Dunbar of West Springfield has been promoted to succeed Harrington.

Harrington went to work for Crocker McElwain as office boy in 1905, one year after the mill was opened. He rose steadily through the ranks and in 1935 was appointed sales manager.

Dunbar started with the Chemical Paper Manufacturing Company in 1918 as a cost clerk. The Chemical and Crocker McElwain are associate mills. He was transferred to the advertising department of both mills in 1921 and in 1929 was promoted to be advertising manager. In 1939 he was named sales promotion manager of Crocker McElwain as well. He is a past president of the Paper Makers Advertising Association.

Alfred Jarisch Takes Over Box Plant Management

NORTH ADAMS, Mass. — Alfred R. Jarisch, who came here March 15 to direct the reconversion program of Henry Jarisch, Jr., Inc., box manufacturer, has been appointed assistant treasurer of the firm and as such will be in charge of local operations, it has been announced here.

He succeeds C. H. Harris, former general manager, and Miss Faith W. Carley, former office supervisor, both of whom have resigned.

Jarisch was transferred here from the United Folding Box Co. of Holyoke, of which his uncle, Henry R. Jarisch, Jr., is the head. The local plant is a subsidiary of the Holyoke firm. While at the Holyoke plant, Jarisch was assistant to his uncle.

Carl Krancher Joins Ball As Plant Manager

INDIANAPOLIS—Appointment of Carl G. Krancher as plant manager of the straw board factory operated by Ball Brothers at Noblesville, Ind., has been made known by Edmund F. Ball, executive vice-president. Mr. Krancher has been plant engineer for the last two years for the Ohio Box Board Company, Rittman, O. Russle Shew, plant superintendent at Noblesville, will continue in that capacity.

Provincial Paper Advances Executives to New Posts

TORONTO — A special dispatch to the Globe and Mail from Port Arthur, Ont., reveals that several executive changes in the staff of Provincial Paper, Ltd., were announced by Arthur G. Pounsford, director of manufacturing for all the company's plants there and in Eastern Canada. A. G. Scott, assistant to the manager since the fall of last year, is appointed assistant director of manufacturing of the Port Arthur division; W. J. Morris, purchasing agent of the Port Arthur division, is named manager of purchases, with headquarters at Toronto; W. C. Reynolds, building supervisor of the Port Arthur division, is appointed office manager of the Georgetown division.

RICHARD W. MORSCH

Recently named manager of its Los Angeles office by the J. O. Ross Engineering Corporation

Morey Appoints Oberreich In Mid-West Territory

FITCHBURG, Mass. — Karl A. Oberreich, of Neenah, Wis., has been appointed by the Morey Paper Mill Supply Company as its mid-west representative. Mr. Oberreich will handle territory including Wisconsin, Michigan, Minnesota, Ohio, Illinois and Indiana and will spend his time exclusively in serving the paper mills the Morey line of dryer felts, screen plates, machine aprons, carrier rope, deckle webbing and other supplies.

Mr. Oberreich has had many years of closest association with the pulp and paper industry as assistant general purchasing agent for one of the largest paper mills in the country. He is a college graduate, trained in the technical end and thoroughly appreciates the requirements both in quality and service, of the important operating supplies required by the pulp and paper mills.

Southern Bag Advances Allin

BOSTON—William M. Allin, formerly general sales manager, was elected vice-president in charge of sales at the annual meeting of the board of directors of the Southern Advance Bag & Paper Company, Inc.

C. J. West Jr. Heads Lake States TAPPI Section

ALBERTON, Wis.—Clarence J. West, Jr., of Kimberly-Clark Corporation, is the new president of the Lake States section of the Technical Association of the Pulp and Paper Industry. Vice-chairman is Alfred M. Heald, of Marathon Corporation, Menasha; and secretary-treasurer is George R. Sears, of the Institute of Paper Chemistry. On the executive committee are Loren V. Forman, of the Institute; John A. Hanson, of Badger Paper Mills, Inc., Peshtigo; George J. Brabender, of Marathon Corporation, Rothschild; Karl W. Fries, Rhinelander Paper Company; and Mark W. Bray, of the Forest Products Laboratory, Madison.

NAM Appoints Appleton Men To Industrial Committees

APPLETON, Wis. — Three Wisconsin industrialists have been named in New York to serve this year on important committees of the National Association of Manufacturers. They are W. E. Buchanan, president and treasurer of Appleton Wire Works, Inc., appointed to the government spending committee; D. K. Brown, president of Neenah Paper Company, Neenah, international economic relations committee; Frank L. Zaug, president of American Plywood Corporation, New London, industrial capital committee.

McGinley Turns to Painting

WAUSAU, Wis. — When Andrew W. McGinley retired two years ago as foreman in charge of painting for Marathon Corporation after 27 years of service he didn't put away his brushes but swapped them for art brushes. He bought canvas and paint, and in a studio rigged up in a spare room in his home he went to work. He has turned out 25 canvases in the last two years, many of them copies of other printings, but some of them originals.

McCrory Presides at Safety Meeting

WAUSAU, Wis. — E. C. McCrory of the Marathon Corporation was to be chairman of the pulp and paper section of the Wisconsin River Valley Safety conference in the Central school auditorium here June 5. "Wisconsin's Record" was scheduled to be the topic of Voyta Wrabetz, Madison, chairman of the Wisconsin State Industrial Commission.

Teaze Leaves Ferguson Firm

NEW YORK — Moses H. Teaze has withdrawn from membership in Hardy S. Ferguson and Company.

Robertson Entertains Canton Old Timers

CANTON, N. C.—Reuben B. Robertson, president of the Champion Paper & Fibre Company, was host to between 250 and 275 members of the company's 15-year continuous service group with a buffet supper and musical program at Canton armory here May 31.

The principal speaker of the evening was Reuben B. Robertson, Jr., executive vice-president of the company, from general offices at Hamilton, O. His message followed that of his father, who presented service emblems to 42 new club members who have completed between 15 and 20 years of continuous Champion service. Mr. Robertson spoke briefly of the loyalty to Champion of the club members, before presenting the club emblems.

H. A. Helder, Canton division manager of the company, gave the address of welcome to club members, and Albert C. Conley, of Champion's finishing department, responded.

The program had its humorous side when Tull Jamison, retired Champion employe, appeared and rendered several of "Tull's Tales."

Adding sparkle and wit was G. W. Phillips, editor emeritus of "The Log," Champion's monthly publication, who acted as master of ceremonies.

Preliminary dinner music was furnished by Fred Carpenter, while the Champion girls, singing under the direction of Marie Bell, Champion Y staff member, featured the musical part of the program from a vocal standpoint. They rendered the "Champion Song" as a special feature of preliminary entertainment. Words for the "Champion Song" were written by Homer Latimer, director of papermaking for the Champion organization, of Hamilton, O., while the music was written by Mrs. Reuben B. Robertson, wife of the company president.

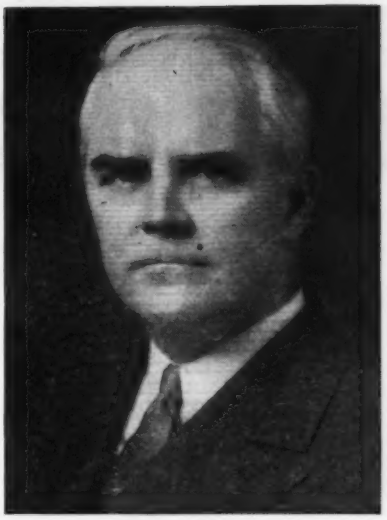
Mrs. Ben Grube had charge of the preparation and serving of the menu.

Officials said the club membership, including new members, totals 303 Champion employes.

Peru Raises Tariff on Paper and Paper Goods

WASHINGTON—The new import tariff schedule of Peru becomes effective June 15, including marked increases in the rates on paper and paper products, as well as various other commodities, the Office of International Trade reported last week.

However, said the agency, it is assumed that import duties on United States products established in the reciprocal trade agreement negotiated between this country and Peru in 1942, will remain unchanged. Information on new rates is obtainable from the American Republics Division of the Department of Commerce, it was stated. So far as could be learned, American paper products are covered in the treaty.



REUBEN B. ROBERTSON
Plays host at Canton, N. C.

Fox River Celebrates Industrial Night

APPLETON, Wis. — The third annual "Industrial Night" of the Fox River Valley Traffic Club was held Tuesday evening, May 27, at North Shore Golf Club. More than 275 representatives from industry, the railroads and trucking firms were present. They attended from cities throughout the midwest as well and from the Fox River Valley.

Roy Sund, vice-president of Marathon Corporation, Menasha, in charge of manufacturing, was toastmaster. The principal speaker was Herb Graffis, Chicago, editor of *Golfing* and columnist for *The Chicago Daily Times* and *Esquire*. His topic was "The Humor of Golf."

Representing their various fields at the speaker's table were F. J. Sensenbrenner, Neenah, retired chairman of the board of Kimberly-Clark Corporation, industry; H. C. Grout, Minneapolis, president of the Soo Line Railroad, rail carriers; Herbert Olson, Green Bay, president of the Olson Transportation Company, trucking firms.

R. H. Lorenz, Appleton, is president of the Fox River Valley Traffic Club, and George M. Thompson, Menasha, was general chairman of the program.

Neenah and Niagara Falls Share Bowling Honors

NEENAH, Wis. — Neenah Research and Development captured the Kimberly-Clark inter-mill bowling tournament May 17 with a 2,724 series, while Niagara Falls mill, rolling on their own alleys and forwarding scores to Neenah, took women's honors with a 2,381.

SAPEYES Open Season On Knollwood Links

CHICAGO—The SAPEYES had their first golf tournament on May 21 at the Knollwood Country Club in Highland Park. About thirty attended the initial outing session, the attendance having been curbed by threatening weather earlier in the day. According to Lennox Ransome, Union Bag, and chairman of the outing committee, the SAPEYES will not get another chance at an outing until August 8 at the Medinah Country Club. Mr. Ransome reported a great difficulty in finding sites for the outings which are usually held monthly. Clubs, in 1947, Mr. Ransome reported, are much less inclined to loan out their facilities. Low gross winner of the first outing on the 21st was Sterling Brown of Champion Paper, with Tom Gorman of Union Bag winning the first low net honors.

On Monday noon, May 26, the western division of the Salesmens Association of the Paper Industry let the bars down to guests and invited a goodly crew of interested folks to hear John W. Crosson of Mead Sales Company, New York, discuss "Technical Salesmanship." Mr. Crosson's reputation preceded him as he had already given this exceptionally interesting talk before the Eastern division. The Hotel Sherman room was comfortably filled with interested members and guests who also heard from E. W. Tinker, executive secretary-treasurer, and Dr. L. T. Stevenson, assistant treasurer of the American Paper and Pulp Association. Both gentlemen stayed over in Chicago, following the successful meetings of the superintendents held at the Edgewater Beach Hotel last week.

On May 19 the western division heard a most interesting talk given by H. J. Jensen, secretary-treasurer of Frederick A. Stresen-Reuter, Incorporated. The company manufactures varnishes and driers used in the various types of printing. The talk was of a technical nature but given in a most interesting way as Mr. Jensen combined the practical and technical information in a way that invited many questions from his listeners.

Bemis Will Distribute Fischbein Bag Closer

MINNEAPOLIS—The Dave Fischbein Company, manufacturers of industrial sewing machinery, has appointed Bemis Bro. Bag Co., with its many strategically located sales divisions and offices, exclusive distributor of their new hand electric filled bag closer.

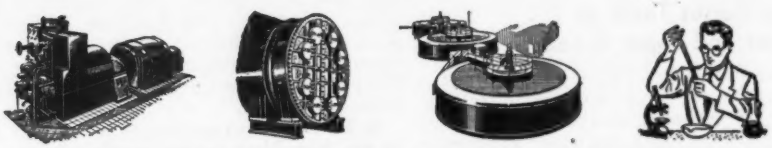
Currently priced at $225, net Minneapolis, the new machine fulfills a variety of bag closing needs, and according to the Bemis Company, is meeting with much success. Production of the units is being increased by the Fischbein Company, and they report ability to make prompt shipment.

Looking for Us,

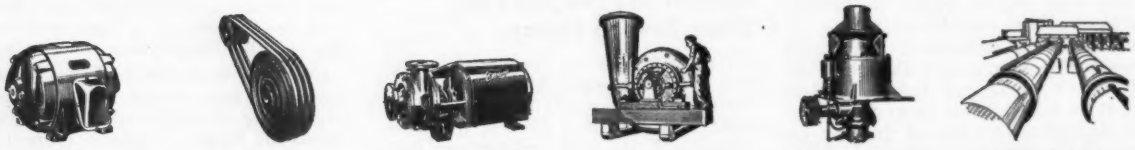
Reproduced from an Old Engraving in Sears Pictorial Description of the United States Published 1848

1847 1947
A CENTURY OF SERVICE
to Industry
THAT MADE
America Great

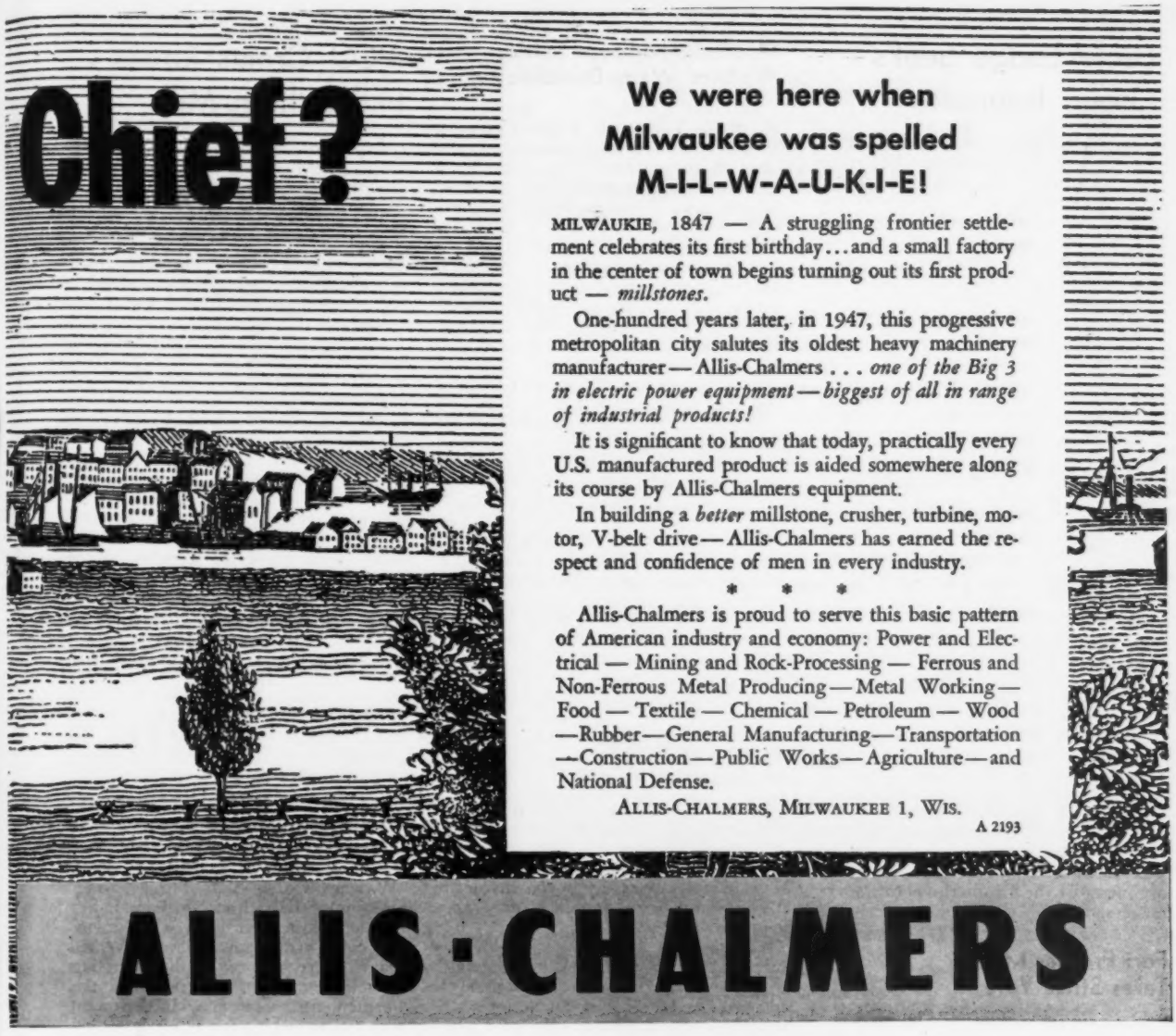
One of the Big 3 in Electric Power Equipment —



COMPLETE POWER GENERATION MACHINERY — Steam Turbines, Condensers, Air Ejectors, Hydraulic Turbines, Generators, Boiler Feed, Condensate, and Circulating Pumps, Water Conditioning . . .



Motors — All Types | Texrope V-Belt Drives | Centrifugal Pumps | Blowers & Compressors | Crushing, Cement, Mining Machinery | Chemical & Pyro-Process Equipment



We were here when Milwaukee was spelled M-I-L-W-A-U-K-I-E!

MILWAUKIE, 1847 — A struggling frontier settlement celebrates its first birthday... and a small factory in the center of town begins turning out its first product — *millstones.*

One-hundred years later, in 1947, this progressive metropolitan city salutes its oldest heavy machinery manufacturer — Allis-Chalmers . . . *one of the Big 3 in electric power equipment — biggest of all in range of industrial products!*

It is significant to know that today, practically every U.S. manufactured product is aided somewhere along its course by Allis-Chalmers equipment.

In building a *better* millstone, crusher, turbine, motor, V-belt drive — Allis-Chalmers has earned the respect and confidence of men in every industry.

* * *

Allis-Chalmers is proud to serve this basic pattern of American industry and economy: Power and Electrical — Mining and Rock-Processing — Ferrous and Non-Ferrous Metal Producing — Metal Working — Food — Textile — Chemical — Petroleum — Wood — Rubber — General Manufacturing — Transportation — Construction — Public Works — Agriculture — and National Defense.

ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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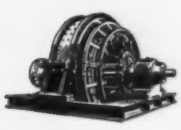
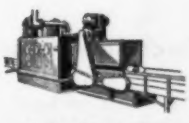
Biggest of All in Range of Industrial Products

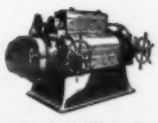
POWER DISTRIBUTION — Switchgear, Voltage Regulators, Transformers, Circuit Breakers, Unit-Substations, M-G Sets, Mercury Arc Rectifiers . . .



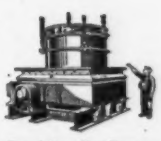
POWER UTILIZATION & CONTROL — Motors, Starters, "Regulex" Exciters, Electronic Heaters and Devices, Welders, Remote Control, Betatron . . .



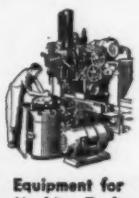
Pulp, Paper, Saw-Mill Equipment



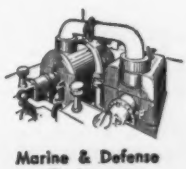
Food, Milling & Extraction Equipment



Precision-Casting — Foundry Equipment



Equipment for Machine Tools



Marine & Defense Equipment

Farm & Industrial Tractors

A 2193

Eagle Lodge Seeks Group Insurance

HOLYOKE, Mass. — A union request for a group health-accident-life insurance program, with employers paying three-quarters of the cost and employes one-quarter, was a chief topic of conversation at a conference between representatives of the local paper manufacturers and of Eagle Lodge and Local 226 of the International Brotherhood of Papermakers.

The conference, held in the office of Harold T. Marin, labor relations adviser to a group of the manufacturers, was the second session dealing with a new contract. Main features of the union demands are a 20-cent hourly wage raise, the insurance program and the "check-off" or company deduction of union dues.

Besides Martin, the manufacturers were represented by a sub-committee comprising Henry V. Burgee, vice-president and general manager of the Parsons Paper Co.; F. C. Reid, vice-president of the American Writing Paper Corp., and E. C. Tucker, president of the Chemical Paper Mfg. Co. and vice-president of the Crocker-McElwain Co.

Eagle Lodge was represented by President Robert Cameron, Financial Secretary Andrew Beaton and Vice-president Edward Zakrewski. Local 226 was represented by President Fred Knowles, Financial Secretary John Houlihan and Committeeman William Hogg. Leading the union delegations was Edward M. Moore, international organizer of the Brotherhood of Papermakers.

Fort Frances Mill Takes Strike Vote

FORT FRANCIS, Ont. — The International Brotherhood of Pulp Workers is ready to continue negotiations with the Ontario-Minnesota Pulp and Paper Company "if and when" the company changes its position regarding a general wage increase of 14 cents an hour, S. A. Stephens of Thorold, chairman of the union's negotiating group, said this week.

Mr. Stephens said a four-hour shutdown of the company's Fort Frances mill recently was arranged in agreement with company officials to allow all workers to attend a mass meeting to hear the negotiating committee report. The Fort Frances local voted in favor of strike action to take effect in 30 days to enforce demands.

Southern Kraft Ups Pay

JACKSONVILLE, Fla. — According to the International Brotherhood of Paper Makers, Southern regional office, a contract with Southern Kraft Division, International Paper Company, has been renewed giving 12,000 employes in six States a 15 cents an hour increase.

Moore & Thompson Settles Workers' Wage Demands

BELLOWS FALLS, Vt. — Workers at Moore & Thompson Paper Company here have settled wage demands on the basis of the national wage pattern of 15 cents an hour package settlement, according to Henry N. Hicks, business agent of UE-CIO local 218. The settlement includes a 10 cents general wage increase, retroactive to April 14, four paid holidays, a vacation of three weeks with pay for employes with 20 years' service, and improvements in the insurance and profit sharing plan.

The new insurance clause calls for life and accidental death coverage and disability payments, hospitalization and surgical insurance, as well as the medical and physical service plan of the New Hampshire-Vermont Hospitalization service. The cost of the insurance will be paid for completely by the company.

The company's profit sharing plan has been changed to allow the employe to draw 48 percent of his accumulated share of the profits annually. It had previously been held in trust until the employe retired or left the employ of the company. Hicks said the average annual amount credited to each employe had been about $250.

Green Bay Will Bill At Accepted Prices

GREEN BAY, Wis. — Hoberg Paper Mills recently declared a new policy in regard to acknowledging and invoicing orders to customers. Effective May 23, all orders are to be invoiced at the same price at which they are acknowledged.

"Although we have no way of knowing what is ahead of us in the way of higher costs," said John Maloney, sales manager, "we feel our action will have beneficial effects. Orders will be acknowledged approximately 30 days prior to delivery, and will give our distributors ample time to establish with certainty their resale prices.

"This new policy should have the effect of stabilizing resale prices on our line of products," he further stated, "and we hope all of our customers will cooperate by using only fair and equitable schedules in order that the retailer and consumers may benefit in this national trend toward lower living costs."

Newsprint Union Program Studied

MONTREAL, Que.—A program calling for negotiations on the six-hour day, establishment of a standard wage schedule, paid vacations, a guaranteed wage equal to full time operation and various other points is being studied by 35 representatives of Ontario newsprint manufacturers.

The program is included in the labor-management conference being held here.

IPCO Grants Raises In Northern Mills

NIAGARA FALLS, N. Y. — International Paper Company employes will receive wage increases of from 14 to 23 cents an hour, according to an agreement announced by local representatives of International Brotherhood of Paper Makers, Local 51, International Brotherhood of Pulp, Sulphite and Paper Mill Workers, Local 9, and officials of the company.

The agreement affects the book and bond and groundwood specialties divisions of the company, including mills in this city, Palmer Falls, Ticonderoga, Tonawanda, Livermore Falls, Me., and York, Pa.

The base rate at the local mill under the new agreement is $1.01 per hour for females and $1.09 for male employes. A general increase of 14 cents an hour was granted workers in the lower wage brackets; workers in the higher brackets will receive increases of 13 percent which makes a total increase, on the base rate of 34 cents an hour, since V-J day.

Representing Local 51 of the Paper Makers were President Carl R. Landy and Secretary Arthur Knoll. Pulp Sulphite Workers delegates and officers were James J. Johnson, president; Ed Connolly, trustee; and Carl J. Colucci, delegate.

Knowlton Brothers Unveil Memorial Service Plaque

WATERTOWN, N. Y. — Three former employes of Knowlton Brothers Paper Mill, who lost their lives while members of the armed forces during World War II, were honored at the unveiling of a service plaque at the mill recently. The men, Sgt. Clarence Hall, Second Lieut. Gustave Hutterman, and Second Lieut. Edward Spedding, were all members of the U. S. Army.

The unveiling was witnessed by relatives and friends of the men. David C. Knowlton, vice-president of Knowlton Brothers, spoke briefly.

Eaton Veterans Organize

PITTSFIELD, Mass. — Employees of the Eaton Paper Corporation, who were veterans of World War I or II, have formed a veterans club and an organization dinner was held recently. Howard Carduff was elected president and George O. Hawley treasurer. Col. William H. Eaton, chairman of the board at Eaton's, was chief speaker at the dinner.

Worthington Force Seeks Raise

HOLYOKE, Mass.—Negotiations for a wage increase of 15 cents an hour, a union shop and a dues checkoff have begun at the Worthington Pump and Machinery Corp. between management and labor.

OUT OF THE FRYING PAN...

into high-grade soap!

LOW-GRADE KITCHEN FATS are now being used to make high-grade soaps! It's another interesting application of the powerful oxidizing action of chlorine dioxide.

The key to the commercial usage of chlorine dioxide is Mathieson's sodium chlorite ($NaClO_2$). This stable chemical permits *controlled* production of chlorine dioxide by industry . . . by the soap industry for the upgrading of inferior fats and oils . . . by the paper industry for the bleaching of kraft, sulfite, soda, rag and flax pulp to high brightness with minimum loss of fiber strength . . . by the water works field for the removal of unpleasant tastes and odors. In the textile industry, sodium chlorite itself provides the safe bleaching of cottons and rayons to *extra* whiteness.

It will pay you to investigate the many industrial applications of this unique oxidizing agent. Write to The Mathieson Alkali Works (Inc.), 60 East 42nd Street, New York 17, N. Y.

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CAUSTIC SODA . . . SODA ASH . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . CHLORINE DIOXIDE . . . AMMONIA, ANHYDROUS & AQUA . . . HTH PRODUCTS . . . FUSED ALKALI PRODUCTS . . . DRY ICE . . . CARBONIC GAS . . . SODIUM CHLORITE PRODUCTS . . . SODIUM METHYLATE

FINANCE

Southern Kraft Bids For WAA Railroad

TALLAHASSEE, Fla. — Possibility that a huge paper mill may be established at nearby Carabelle on the former site of Camp Gordon Johnston or adjacent areas became brighter last week when the War Assets Administration disclosed that Southern Kraft of Mobile was among the nine bidders for the 50-mile long Tallahassee to Carabelle, government-owned railroad.

Congressman Robert Sikes declared here that a Mobile firm was "seriously" considering the location of a plant at Carabelle, thus giving rise to speculation that Southern Kraft is interested in establishing a paper mill there.

Lyle T. Pritchard, of Jacksonville, regional WAA disposal officer, said it would be some time before the sale would be consummated through bidding, however. He said that after his office has tabulated the bids and made a recommendation, the Washington office still will have to review the bids and there make a decision.

Bagley & Sewall Orders Run Two Years Ahead

WATERTOWN, N. Y.—With orders on hand at the present time to keep the Bagley & Sewall Company busy for the next two years and new proposals for papermaking machines being received by the company, the outlook is extremely bright for the concern, according to L. R. Wisner, assistant chief engineer of the company. Tracing the growth of the business and the expansion that has been carried on during the past few years, Mr. Wisner said that the orders now being filled at the plant are from Finland, South Africa, South America and this country as well as Canada. He pointed out that there are about 800 persons employed in the shop and the offices of the Bagley & Sewall Company.

National Gypsum Votes 25 Cents a Share

BUFFALO, N. Y. — Directors of the National Gypsum Company have declared a dividend of 25 cents a common share, payable July 3 to stockholders of record June 17. The company previously paid a dividend of 50 cents a share on December 20, which was the only disbursement made on the common stock in all of 1946.

Union Bag Votes 25 Cents Extra

NEW YORK—Directors of Union Bag & Paper Corporation today (May 27) declared a regular quarterly dividend of 50 cents per share and an extra dividend of 25 cents per share on the capital stock of the company, payable June 14, 1947, to stockholders of record June 6, 1947.

Marathon Opens Southern Office

ATLANTA, Ga. — With Walter Hill Evans, Jr., as manager, the Marathon Corporation, paper manufacturers, has opened a Southern regional office in the Glenn Building.

Envelope Men Expect Better Business

WORCESTER, Mass.—The opinion that business in the next few months is going to improve and there is no danger of a depression prevailed here at a meeting of the New York and Eastern Seaboard Envelope Manufacturers Association, Inc., held at the Sheraton hotel. Miss N. Myra Glazier, president of Sheppard Envelope Company, was hostess and presided. Fifty attended.

Speakers included: George W. Jones, representing Berlin & Jones Envelope Company, New York City, association president; William H. Woolner, New England director of the association; Leonard Laird, president of New England Envelope Company; Joseph Price of H. P. Andrews Company, New York City; H. J. Smith of Berlin & Jones Company; Walter Berkowitz, Kansas City, Missouri, director of the Envelope Manufacturers Association of America; Miss Glazier; Emmanuel Schoenzeit, New York City, treasurer; and Norman Schaffer, New York City, association vice-president.

The speakers said the paper shortage is hampering their companies' expansion plans.

After the luncheon, association officers and Miss Glazier visited Mayor Sullivan at City Hall. The mayor presented keys to the city to Jones and Shaffner.

Rayonier Declares Dividend

NEW YORK — Directors of Rayonier Incorporated have declared the regular quarterly dividend of 50 cents per share on the $2 dividend cumulative preferred stock, payable July 1, 1947, to stockholders of record June 13, 1947.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending May 31, 1947

STOCKS

	High	Low	Last
A. P. W.	....	....	....
Armstrong Cork Co.	40⅝	39¾	40¼
Armstrong Cork Co., pf.	104	104	104
Celotex Corp.	23⅛	21	23
Celotex Corp., pf.	20⅜	20¼	20¼
Certain-Teed Products Corp.	14⅛	12¾	14⅛
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	20¾	19½	20¾
Champion Paper & Fibre Co., pf.	107½	107	107½
Congoleum Nairn Co.	25½	24¼	25¼
Container Corp. of America	36	34⅛	36
Crown Zellerbach Co.	26½	25⅜	26
Crown Zellerbach Co., pf. 4.20	102½	102½	102½
Crown Zellerbach Co., 4 pf. 4	108⅝	107½	108⅝
Dixie Cup Co.	26¼	26¼	26¼
Dixie Cup Co., A	53	50½	53
Flintkote Co.	28⅛	25½	27⅝
Flintkote Co., pf.	....	....	....
Robert Gair	6⅜	6⅛	6⅜
Robert Gair, pf.	20⅛	20⅛	20⅛
International Paper Co.	42½	40⅛	42¼
International Paper Co., pf.	101¼	100½	100½
Johns Manville Corp.	112	110	111¾
Johns Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.	24	23	23
Kimberly-Clark Corp., pf.	107½	106	106
Mac Andrews & Forbes	36	36	36
Mac Andrews & Forbes, pf.	....	....	....
Marathon Corp.	20⅜	19⅝	20⅛
Mead Corp.	18	17	18
Mead Corp., pf. 4¼	....	....	....
Mead Corp., pf. 2	....	....	....
National Container Corp.	37¼	35¼	37
Paraffine Companies, Inc.	....	....	....
Paraffine Companies, Inc., pf.	108	108	108
Rayonier, Inc.	20⅜	19	20¼
Rayonier, Inc., pf.	36¾	36⅝	36¾
Ruberoid Co.	45¾	44⅜	45¾
Scott Paper Co.	44¾	43⅞	44¾
Scott Paper Co., pf.	98½	98½	98½
Sutherland Paper Co.	37½	37¼	37½
Union Bag & Paper Corp.	29¾	27¼	29¾
United Paperboard Co.	14¾	14⅜	14¾
U. S. Gypsum Co.	93½	90½	93½
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	36	35¼	36
West Virginia Pulp & Paper Co., pf.	111½	110½	111½

BONDS

Abitibi Pulp & Paper Co., 5s '53	....	....	....
Celotex Corp., 3¼s '60	....	....	....
Certain-Teed Products Corp., 5½s '53	....	....	....
Champion Paper & Fibre Co., 3s '65	103½	103	103½
Mead Corp., 3s '66	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending May 31, 1947

STOCKS

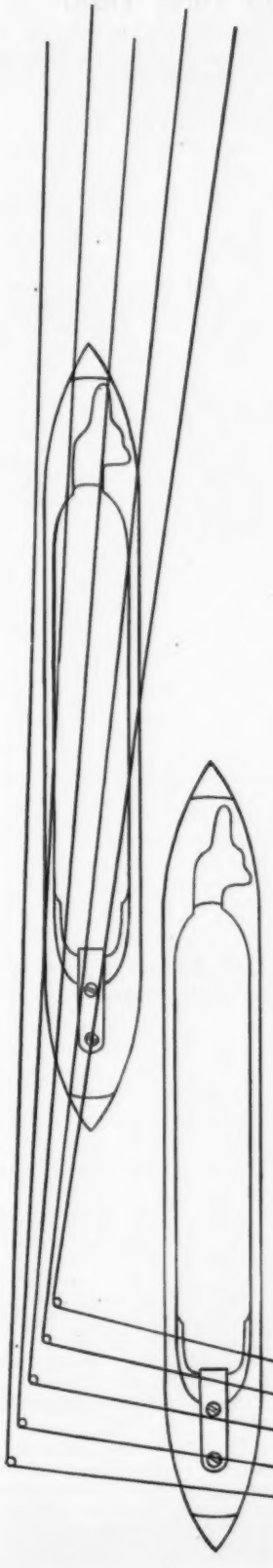
	High	Low	Last
Great Northern Paper Co.	41	40⅝	40⅝
Hummel Ross Fibre Corp.	....	....	....
St. Regis Paper Co.	8⅞	7⅞	8⅛
Taggart Corp.	9	9	9

BONDS

American Writing Paper Co., 6s '61	100½	100½	100½

TENAX FELTS ARE MADE TO HELP YOU KEEP

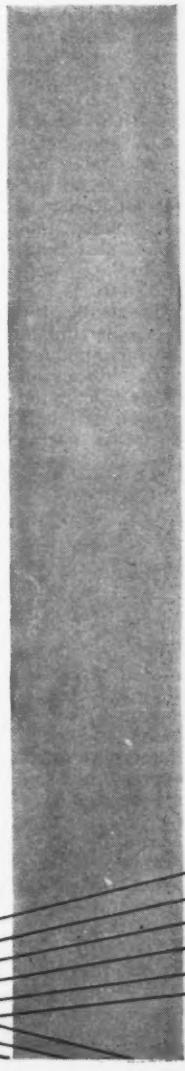
PRODUCTION UP AND COSTS DOWN



Ours is a source of supply and a service organization to paper makers . . . and so it has been these 56 years. It is our experience and observation that you are solely interested in felts that produce more and cost less—and rightly so, for felt is wholly a unit of production.

TENAX
"TENAX FELTS ARE TOUGH"

So the more that goes into the felts you use—in quality of materials and excellence of workmanship—the more you get out of them. It is a matter of simple arithmetic, figured in hours of continuous running of your machines.



It is to this standard of service and satisfaction that we make **TENAX FELTS.** Made from virgin wools, different wools that weld together for *tenacity*, they are counted by many leading papermakers as the best performing, lowest cost felts they ever used. We invite you to put **TENAX FELTS** to the test in your mills. Our field men are at your service, as is our entire organization.

LOCKPORT FELT COMPANY
NEWFANE, NEW YORK
SERVING THE PAPER INDUSTRY SINCE 1891

Canadian Pulp Mills Seek D. P.'s To Relieve Woodsmen Shortage

(Continued from page 7)

too rapidly to guarantee steady production of sorely needed paper."

The selection party for the pulp and paper companies is headed by G. A. Kingston of Montreal, a former engineer of the Canadian Pulp and Paper Association. He left by air for Britain May 28. The two other members, who left May 29 by air are Andrew Opaski of the Great Lakes Company and Emil Tarnowecky of the Abitibi company. From Britain the party goes to the United States occupation zone of Germany where they will select recruits from thousands in displaced persons' camps.

The arrival of the Polish girls to work in the spinning mills in Quebec seems to have caught the labor interests by surprise. Apparently nothing was known about the plan to select immigrants by private interests until a few days before the arrival of the Polish girls. Labor union representatives were quick, however, to voice their objections to this method of selecting immigrants for Canada. The Polish girls were given a two-year contract and labor has always been unalterably opposed to "contract" labor. They call it "yellow dog" contracts, and claim that indentured or contract labor was done away with in Canada as far back as 1921.

Labor leaders profess to be in favor of regulated immigration and favor Canada absorbing a limited number of the displaced persons of Europe on a selected basis, according to the labor requirements of this country, but appear to be unanimous in the opinion that such immigration should be left entirely to responsible representatives of the Dominion government. The selection of immigrants by private enterprise is particularly distasteful to them and most of organized labor's leaders have already voiced their opinions publicly.

Labor leaders contend that there is no great shortage of bush workers in Canada at the present time and that hundreds of bush workers are unemployed. They are suspicious that these new arrivals from Europe will be used to break strikes and point out that there is currently trouble in some of the spinning mills of Quebec. Settlement of strikes by immigration was a threat seen by John Buckley, secretary-treasurer of the Trades and Labor Congress of Canada. "Immigration must be under direct control of the government and not of employers. The government must determine whether there is a shortage of workers. Employers will say there is a shortage whenever there is a strike, and there is a strike on now in the textile industry. Strikes have been settled before now by importing labor," Mr. Buckley contended.

"It is contrary to Canadian ideas of self-respect and in opposition to all labor principles," said Norman Dowd, executive secretary of Canadian Congress of Labor. "Immigrants, once located in Canada, should be free to move about and make their own arrangements for employment. These Polish women are obligated to work at a certain place and at minimum wages. This is virtually indentured service, something entirely foreign to Canadian ideals," Mr. Dowd said.

"The only missing features in the government approved policy of importation of contract labor from the displaced persons' camps of Europe are the galleys and auction blocks which formed part and parcel of the slave trade which all civilized people thought had disappeared forever," said A. A. Mosher, president of Canadian Congress of Labor, and official spokesman for over 300,000 unionized Canadians.

Resume Pulp Shipping To Klondike Dock

OGDENSBURG, N. Y.—The docking of S. S. "Ashlief," Canadian freighter chartered by the George Hall Corporation, at the old "Klondike" pulp dock, two miles above the city to unload a load of pulpwood for the B-F-D company, marks the first time in about 25 years that the dock has been used for such purposes. Not since about 1925 when the pulp terminal and dock were closed down has pulpwood been unloaded at the dock, one mile above the mill company site.

The pulp dock and terminal were first established in the early 1900's by the DeGrasse Paper Company of Pyrites which brought woodpulp from the lower St. Lawrence, around Port Au-Salmon, Chicoutimi and other low points on the river, to the terminal for winter storage and shipment to the five-machine newsprint mill at Pyrites.

About 1912 the DeGrasse Corporation was purchased by the old New York World, then owned by Joseph Pulitzer, who also purchased the High Falls Pulp and Paper Company of Chateaugay, where one newsprint machine was located.

Between 50,000 and 75,000 cords of spruce, balsam and other pulpwoods were shipped to Ogdensburg and unloaded at the old pulpwood dock annually during its period of operation.

George Opens Own Consulting Service

SAN FRANCISCO—Andrew J. George, for twenty-five years chief chemist for the Schmidt Lithographing Company, has resigned from that post to open his own office as a consultant on plate making problems. He is president of the Pacific Society of Printing House Craftsmen and a member of the American Chemical Society.

Holyoke Machine Co. Enters Filter Field

HOLYOKE, Mass.—The Holyoke Machine Company, long and favorably known in the paper industry for "Holyoke" paper finishing machinery, cotton and paper calender rolls and other heavy machinery, has entered the gravity and pressure filter field. Under new and progressive management this is just one of the post-war developments "Holyoke" has in store for old and new customers.

When it was learned last October that the Norwood Engineering Company could no longer furnish repair parts or additional beds for equipment which it previously had made, Holyoke decided, as a service principally for the paper industry, to help such customers. The necessary tools, jigs, fixtures, patterns, etc., were acquired together with some of the former Norwood personnel. At the same time a survey of the filter business was made, the results of which indicated there was a definite place for "Holyoke" in this field. The services of more of the industry's best known filter engineers were then obtained and a filter department established under the direction of John W. Gaitenby.

With an able staff of engineers on deck and experienced help all along the line, plans were carefully completed so when the time arrived "Holyoke" could offer users of gravity and pressure filters years of "know how" streamlined for modern times and conditions.

The firm will specialize in filters for the paper and textile trade, municipalities, swimming pools and soft drink bottlers.

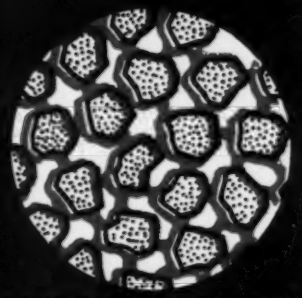
House Cuts Budget For Forest Laboratory

MADISON, Wis. — In passing the Agriculture Department appropriations bill last week, the House of Representatives at Washington voted $1,000,000 for the United States Forest Products Laboratory in this city for the fiscal year, beginning July 1. This is a reduction of $555,000 from the budget recommendations.

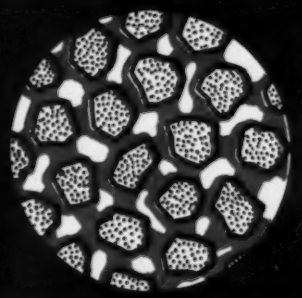
Representative Davis, Wisconsin Republican, offered an amendment to the bill to increase the money to the budget figure, but it was defeated on an 81 to 54 standing vote. Davis, replying to the appropriations committee's comment that "much of the work is academic or visionary," said, "This work has been highly practical and has repaid a thousandfold the government investment."

About 150 of the 450 employes of the Laboratory recently received tentative dismissal notices in anticipation of a reduction in the amount requested. The United States Senate has still to act on the bill.

Here's How We Fit a Pulpstone *to Your Particular Job*



This schematic diagram shows that a pulpstone is composed of grains of abrasive (dotted) held together by "posts" of bond (red) and with voids or open spaces between them.



This diagram shows another pulpstone of the same grit (grain size) and structure (grain spacing) but of a harder grade as indicated by the thicker and stronger bond posts.

FIRST we select the correct abrasive — Alundum stones are best for some mills, 38 Alundum for others and Crystolon stones for still others.

Next comes the choice of grit size — fine grit stones for book papers, coarse grit for newsprint or insulating board.

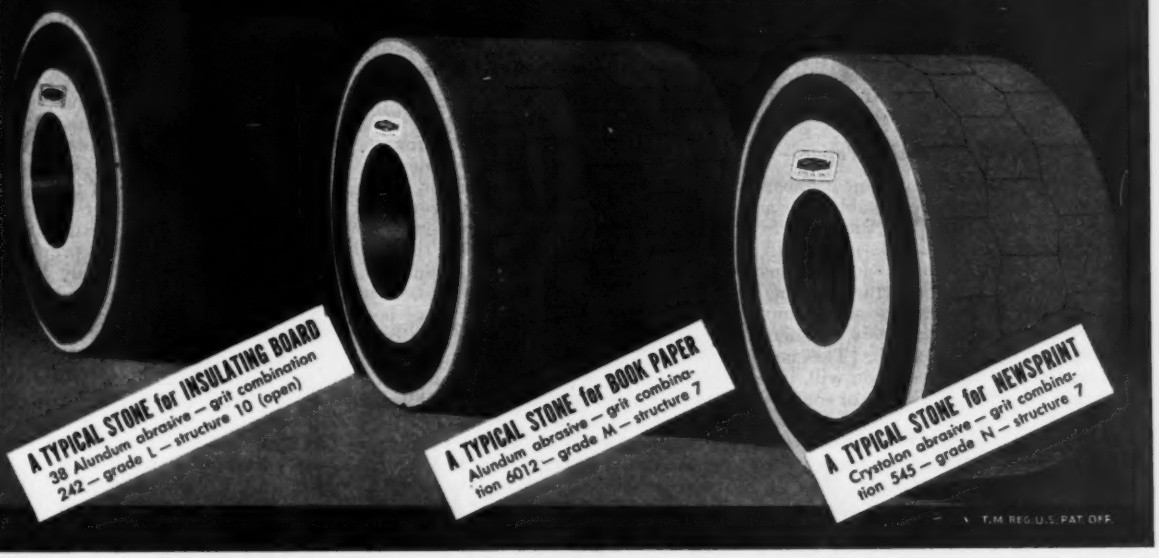
Then comes the selection of the correct grade which, in grinding wheel terminology, means the hardness of the stone. And this matter of hardness is not determined by the hardness of the abrasive (that remains constant) but by the amount of bond which holds the grains together. The more bond the harder the stone.

The fourth variable is the structure of the stone — the spacing of the grain by the Norton Controlled Structure process. For example, an open structure stone (wide grain spacing) is used for producing insulating board, and more dense structures for newsprint and book papers.

Yes, your Norton Pulpstones are "tailor-made" for their job — to produce *your* type of pulp from *your* type of wood with *your* type of equipment.

NORTON COMPANY, WORCESTER 6, MASS.
Norton Company of Canada, Ltd., Hamilton, Ont.

NORTON ABRASIVES


A TYPICAL STONE for INSULATING BOARD
38 Alundum abrasive — grit combination 242 — grade L — structure 10 (open)
A TYPICAL STONE for BOOK PAPER
Alundum abrasive — grit combination 6012 — grade M — structure 7
A TYPICAL STONE for NEWSPRINT
Crystolon abrasive — grit combination 545 — grade N — structure 7
T.M. REG. U.S. PAT. OFF.

NEWS DOWN UNDER

PERTH, W. Australia—Imports of paper during November, 1946, included: Newsprint in rolls, from Canada 14,104 tons, from Newfoundland 2,042 tons; newsprint in sheets, Canada 573 tons, Newfoundland 113 tons; imitation art, U. K. 16 tons, Sweden 10 tons; coated printing, U. K. 26 tons; glazed imitation parchment, U. K. 4 tons; lithographic, machine glazed or one side calendered, U. K. 8 tons, Canada 4 tons, Sweden 11 tons; poster and machine glazed, Norway 5 tons; other printing papers, U. K. 13 tons, Canada 406 tons, Norway 93 tons.

From January 1st, 1947, all Australian newspapers were restored to their base consumption of newsprint, but it is pointed out that the removal of restrictions does not necessarily mean that supplies of newsprint in 1947 will be adequate to maintain the base year standard.

Appita, the abbreviated name of the Australian Pulp & Paper Industry Technical Association, is making good progress, and substantial financial support has already been received from three major Australian paper manufacturing companies. Chairman of the Association's provisional committee is Mr. Godfrey Ellis, who is assisted by Mr. R. B. Jeffreys of Australian Paper Manufacturers Ltd., Mr. H. B. Somerset and Mr. R. J. Hopkins of Associated Pulp & Paper Mills Ltd., Mr. R. W. Henry and Mr. J. L. Somerville of Australian Newsprint Mills Pty. Ltd., and Dr. H. E. Dadswell of the Division of Forest Products of the Council for Scientific and Industrial Research.

At the moment the New Zealand Forest Service, in conjunction with Australian timber companies, is testing the pinus insignis for use in pulp and paper making. To date satisfactory laboratory and mill tests have been made for kraft and bleached pulps, and some 160 tons of pulp is now to be produced for experiments in conversion into various classes of paper and board.

Will Produce Different Paper

It is announced that the new papermaking project to be established at Alfredton, near Ballarat (Victoria) by Thomas Owen & Co. Ltd., of Cardiff, Wales, will not compete with existing Australian paper manufacturing industries, as the new enterprise will manufacture papers not previously produced within the Commonwealth. The new works, when in full operation will, it is expected, provide work for over 3,000 employes.

The New Zealand Minister of Finance (Mr. Nash) announces plans of the N. Z. Labour Party for the formation of a 2,000,000 pound ($9,600,000 at par) State pulp and paper enterprise, but commercial critics ask: What investigations has the Government made into the raw material resources for such a mill, and the economic market for its products? A public company has previously been pioneering this industry; how will its enterprise be affected? How can labor for a mill of this size be obtained without detriment to the existing and urgently essential timber industry? One of the statements of Mr. Nash is really remarkable. He says: "Cardboard, brown paper, paper bags and newsprint will be manufactured. But there will be a proviso regarding the newsprint. Newspapers that get it must undertake to print the truth in it." As "Newspaper News" points out: If this is seriously intended, it cannot be regarded as being other than an unwarrantable affront to the press, and a threat.

A documentary film, "Timber Makes News," is now being produced in Tasmania on behalf of Australian Newsprint Mills Pty. Ltd., by producer Alexander Cann. Film should be completed in April.

Ivers-Lee (Australia) Pty. Ltd., an Australian subsidiary of the Ivers-Lee organization of England, is being registered in Victoria with a nominal capital of $120,000. It will engage in the manufacture of "Cellophane" wrappers.

The Tasmanian Government is to sell its extensive financial interests in Australian Newsprint Mills Pty. Ltd., announces State Premier Cosgrove. Government holds preference shares valued at $1,200,000, and under present legislation the company has the right to purchase them. To finance its huge expansion programme, which involves a capital outlay of $12,000,000, the company has to raise new capital, a difficult proceedure while the Government holds all the preference shares and has first call on the company's assets.

Australia Studies Tariffs

Despite the admission recently that Customs officials were studying Australian tariffs in preparation for the forthcoming international trade conference, the Prime Minister (Mr. Chifley) now says, "The Government intends to proceed with its plans for the progressive industrialization of Australia, and will impose additional protective tariffs where necessary." But already official requests have been received for the lowering of tariffs on cardboard, and copying, greaseproof, printing, tissue, wrapping, writing and typewriting papers, and these will now have to be officially considered.

Continued industrial troubles throughout Australia (particularly in Victoria, where in six months no less than 1,195,648 man-days were lost, and where the Associated Chambers of Commerce have now started to raise a fund to fight "militant unionism") have affected local output of paper, and costs are steadily rising. One union now puts forward claims for: A minimum wage of $50 a week for both males and females; a 30-hour 5-day week with no overtime unless specified by the union; any overtime worked to be at treble rates; a rest period of 15 minutes twice daily; and 28 days holiday on full pay each year, plus 12 public holidays. At these rates and conditions one wonders how it will ever be possible to catch up with shortages or to sell output at reasonable rates.

It would seem that added imports are badly needed, but the present outlook regarding imports from the United States is not good, as the shortage of dollar funds is acute. However, the situation may be improved in a few months when the terms of the Anglo-American financial agreement can be implemented.

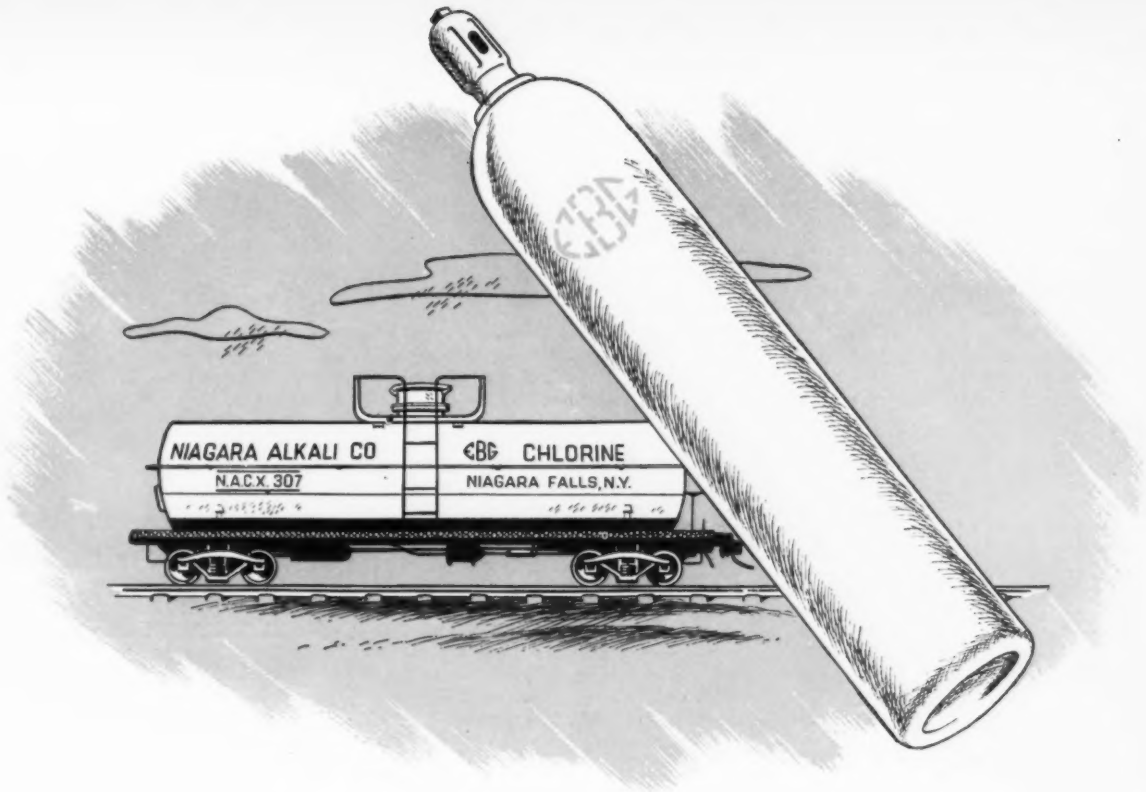
In the meanwhile serious efforts are being made to secure a cut in the heavy customs duty and sales tax rates, for it is computed that many lines which cost $100 in Great Britain cost as much as $203 when landed in Australia, customs duty and sales tax often amounting to as much as 47 percent. Goods from the United States show even heavier imposts.

Wrapping Paper Is Short

At the moment there is a serious shortage of wrapping papers, paper bags, cardboard boxes and the like. Hotels are wrapping bottled beer in newspaper, many retailers are asking customers to bring their own wrappers, and many footwear factories are having to fall back on second-hand boxes for the delivery of their merchandise. In addition, they are asking for the speedy return of such containers.

The first office-bearers of the newly formed Australian Pulp and Paper Industry Technical Association are: Mr. G. W. Ellis (president); Mr. H. B. Somerset (vice-president); Mr. G. H. Wiltshire (secretary); Mr. H. E. Dadswell (treasurer); and Mr. R. B. Jeffreys, Mr. J. L. Somerville and Mr. O. O. Nadebaum on the committee.

Subject to the necessary resolutions being passed and Treasury approval being obtained, Associated Pulp and Paper Mills, Ltd., intends to issue 1,600,000 ordinary shares of one pound ($4.80 at par) each. Of the total issue it is proposed to offer shareholders (other than Zinc Investments, Ltd.) 1,403,633 shares in the proportion of one for every one already held. The remaining 196,367 shares will be offered direct to holders of Zinc Investments, Ltd., which holds that number of Associated Pulp and Paper shares. Ordinary shareholders will have the right of renunciation in favor of other persons, but this right will not apply to Zinc Investments, Ltd. Capital of the company is now to be increased from 3,000,000 pounds to 5,000,000 pounds ($24,000,000 at par) in order that a program of expansion may be fully carried out.



The importance

OF BEING NIAGARA EBG LIQUID CHLORINE

LIQUID CHLORINE continues to increase in importance not only as an agent for the purification of water and the bleaching of textiles, paper and other products but also as a convenient chemical "tool" for the development of new and useful organic compounds.

As the first American producer of this chemical and a pioneer in electrochemical product development, Niagara's service in Liquid Chlorine is backed by advanced knowledge and experience that can be of continuous value to you in obtaining the best results from its use.

A new 48-page booklet giving essential data on the uses, characteristics, physical properties and handling of Niagara EBG Liquid Chlorine is available on request. . . . Niagara Alkali Company, 60 East 42 Street, New York 17, N. Y.

An Essential Part of America's Great Chemical Enterprise

NIAGARA ALKALI COMPANY

CAUSTIC POTASH • CAUSTIC SODA
CARBONATE OF POTASH
LIQUID CHLORINE • NIAGATHAL
PARADICHLOROBENZENE

Pacific Mills Plan $5 Million Expansion

VANCOUVER, B. C. — Expenditure of $5 million is being undertaken by Pacific Mills Ltd. in connection with its pulp and paper plants at Ocean Falls and Vancouver. The company was incorporated in 1915 and now has an investment of $38,000,000, employing 2,000 persons in British Columbia alone, while its sales organization extends from the Pacific Coast to the Great Lakes. The company has two manufacturing plants in Vancouver, and its main plant at Ocean Falls.

During the fiscal year ending April 30, 1947, production at the Ocean Falls' plant exceeded 140,000 tons of newsprint and kraft papers, in addition to 7 million board feet of high grade spruce, fir and hemlock lumber.

The expansion of the Pacific Mills was started during the second World War and by the end of hostilities the company had increased its production by approximately 30,000 tons, and was also producing over 51 million board feet of high grade Sitka spruce lumber, of which more than half was going for aircraft production.

Paul E. Cooper became president of Pacific Mills in 1943, and under his direction plans were prepared with a view to launching the $5 million expansion program as soon as the war ended. This program includes $2 million for the building-up of the timber reserves of the company. Pacific Mills has enlarged its logging operations and established two modern logging communities on a "family home" basis at Sandspit in the Queen Charlotte Islands and in Beaver Cove, near the northeast tip of Vancouver Island. Last year the company purchased the J. R. Morgan Logging Co. interests on Huxley Island and in the Cumshewa section of the Queen Charlotte Islands. It then formed the logging subsidiary company under the name of the Northern Pulpwood Ltd. The Badwater Towing Company was also purchased by the company and is operated as a transportation subsidiary.

The Northern Pulpwood Ltd. subsidiary now supplies a large portion of the 120 million board feet of logs required annually at the Ocean Falls plant. The balance of the log requirements of this plant are obtained from contract logging companies or through purchase on the open log market.

In the town site of Ocean Falls, which has a population of 1,300, and is 310 miles from Vancouver, Pacific Mills has launched a major expansion and improvement program involving the expenditure of $1,250,000.

Largest single item in this program is a $1 million hotel, known as the Martin Inn, which will be the fourth largest hotel in British Columbia and will have 265 rooms. The new structure is not a hotel in the full sense of the word, but represents a complete new concept for housing single employees in an industrial community.

The large majority of the rooms in the hotel will be set aside for occupancy for the unmarried personnel of the mills. A number of rooms, however, will be reserved for transient commercial and tourist trade. The hotel has been named Martin Inn in honor of Archie B. Martin, first president and later chairman of the board of directors of the company who died on June 16, 1945.

Similar accommodations to that for male employees is provided for single women at Ocean Falls in Kimsquit Lodge, the residence which has been completed with its own lounge rooms, laundry facilities, etc.

Fifteen duplex dwellings are under construction as well as a new theatre with seating accommodation for 500, a medical-dental building, and a community hall.

The company is planning $1 million for expansion and improvements to its steam and electrical facilities at Ocean Falls. This project calls for the installation of a 5000 KW back-pressure turbine, a 750 pound pressure Babcock and Wilcox boiler for developing 175,000 pounds of steam power per hour.

Extensive improvements in the electrical sub-stations and switching equipment of the company is also being made.

Pacific Mills are planning $71,000 in surveying the possibilities for development of an additional 30 miles east of the pulp and paper town. If this project is proceeded with, it will require expenditure of approximately $3 million.

The company has spent over $235,000 in improvements in the utilization of wood waste and in the improvement of color and quality factors in newsprint production. A Bauer refiner has been installed and a zinc hydro sulphite bleaching plant erected for groundwood pulp.

Minimum expenditure of a further $300,000 has been budgeted for improvements in the kraft mill of the company which will increase production from 140 to 175 tons daily. These improvements include a Dorr continuous causticizing system, sludge filter, a Swinson-Nyman kraft washer, a Cottrell precipitator, and the replacing of the mill's present 2½ ton kraft digesters with improved digesters of 3½ tons capacity.

Horace B. Everitt

PANAMA CITY, Fla. — Horace B. Everitt, purchasing agent for the Southern Kraft Mills, a subsidiary of the International Paper Company, died here May 25 of a heart ailment. He was 52 years old.

Mr. Everitt had been associated with the local mill since 1930 and came here from Pascagoula, Miss. He was a native of Meridian, Miss.

The deceased leaves his widow and three daughters. The body was sent to Pascagoula for burial.

Powell River Barker Installation

VANCOUVER, B. C.—Installation of a hydraulic barker was recently completed by the Powell River Company at its plant at Powell River, B. C., as part of its $1,800,000 woodhandling system. The new barker will handle standard size logs, while the second barker for handling logs in four to eight-foot lengths, and from four to 18 inches in diameter is also being installed. The chipper mill of the company is being completely reorganized and important new equipment is being installed. For sulphite pulp the new barker is expected to give a log saving of 14 percent with a saving of 9 percent in handling groundwood.

Approximately one-third to one-half of the logs barked at the Powell River mill will be used for chips and the remainder used for groundwood blocks, so it is expected that there will be an overall saving of 10 to 12 percent of the logs normally required for this output. The Powell River plant produces 230 tons A.D. of sulphite every 24 hours. To meet this production under the old system the mill needed about 235,000 feet British Columbia log scale every 24 hours. With the new barker and log chipper system in operation the mill will only require 200,000 feet log scale of unbarked logs to meet the same production. The new hydraulic barker installed at Powell River is similar to the one designed by the pulp division of the Weyerhaeuser Timber Company at Longview, Washington, which was an improvement over the original installation of that company four years ago.

Westminster's New Machine Operates at Capacity

NEW WESTMINSTER, B. C. — Operation of the new paper machine recently installed by the Westminster Paper Company Limited is being maintained at full capacity. The new $1 million machine is reported to have doubled the output of paper specialties made by this firm.

E. M. Herb, president and managing director, speaks of it as the chief feature of the company's $1,750,000 post war extension program which will make this the most efficient and modern mill of its kind in Canada, comparing favorably with any in the world.

The program included $268,000 for buildings. The output of the new machine consists of special types of paper required for facial tissues, waxing paper, fruit wraps and other special uses, and it has rated capacity of 40 tons of paper in 24 hours.

It has added the production of facial tissues to the company's products. Also, because of the larger supply of paper, there is an increase in the number of machines turning out napkins and towels, toilet tissues, printed bread wraps and waxing paper.

IMPORTS

NEW YORK IMPORTS

WEEK ENDING MAY 31, 1947

SUMMARY

Newsprint	1183 rolls
Coated Paper	38 cs.
Printing Paper	45 rolls
Glassine Paper	96 bdls.
Wrapping Paper	791 rolls
Filter Cloth	3 cs.
Strawboard	3198 pkgs., 91 rolls
Miscellaneous Paper	1 pkg.

NEWSPRINT

H. G. Craig Co., G.D.D., Donnacona, 370 rolls.

International Paper Co., International No. 1, Gatineau, 301 rolls.

Madden Reeve Angel & Co., Inc., Danaholm, Helsingfors, 512 rolls.

COATED PAPER

F. P. Gaskell, Egidia, Glasgow, 38 cs. (for cigarette tipping).

PRINTING PAPER

D. C. Andrews & Co., Stavangerfjord, Glasgow, 45 rolls (ground wood super calender).

GLASSINE PAPER

Bulkley Dunton Pulp Co., Cinch Knot, Havana, 96 bdls.

WRAPPING PAPER

Jay Madden Corp., Danaholm, Helsingfors, 791 rolls.

FILTER CLOTH

W. W. Stanley, Mauretania, Southampton, 3 cs.

STRAWBOARD

Joe Salwen Paper Products Corp., Westerdam, Rotterdam, 30 rolls, 3198 pkgs.

Guaranty Trust Co., Ogelthorpe Victory, Antwerp, 61 rolls.

MISCELLANEOUS PAPER

H. H. Machler, Wacosta, Antwerp, 1 pkg.

RAGS, BAGGINGS, ETC.

Continental Bank Trust Co., Bastia, Algiers, 100 bls. rags.

National City Bank, Sobieski, Genoa, 175 bls. dark cotton rags.

(———), Sobieski, Genoa, 39 bls. dark cotton rags.

New England Waste Co., Tweedbank, Shanghai, 100 bls. cotton waste.

(———), Mauretania, Southampton, 7 bls. wool rags.

Continental Bank Trust Co., Egidia, Glasgow, 22 bls. paperstock.

(———), Egidia, Glasgow, 58 bls. new rag cuttings; 35 bls. brown linen thread waste.

Tradesman's National Bank Trust Co., Egidia, Glasgow, 36 bls. old webbing.

OLD ROPE

Hollingsworth & Vose Co., Egidia, Glasgow, 63 coils.

CASEIN

Bank of The Manhattan Co., Cape Fear, Buenos Aires, 200 bags (lactic), 22,046 lbs.

GLUESTOCK, ETC.

Darmstadt Scott & Courtney, Cape Fear, Buenos Aires, 57 bls. gluestock.

A. Bloch & Co., Cape Fear, Buenos Aires, 77 bls. gluestock.

Chase National Bank, Cape Fear, Buenos Aires, 107 bls. gluestock.

John Gorvers Co., Santa Clara, Barranauilla, 175 rolls hidecuttings.

WOODPULP

Pulp Sales Corp., Danaholm, Helsingfors, 4618 bls. (white moist mechanically ground woodpulp).

WOODPULP BOARDS

Jay Madden Corp., Danaholm, Helsingfors, 521 bls. 3433 rolls (solid white).

BOSTON IMPORTS

WEEK ENDING MAY 31, 1947

American British Chemical Supplies, Cape Fear, Buenos Aires, 1000 bags lactic casein, 110,230 lbs.

John Gorvers Co., Cape Fear, Buenos Aires, 135 bls. gluestock.

Pagel Horton & Co., Krageholm, Gefle, 8000 bls. dry sulphite pulp.

Price & Pierce, Ltd., Krageholm, Wallvik, 15,150 bls. dry sulphite pulp.

Stora Kopparberg Corp., Krageholm, Skutskar, 10,985 bls. dry pulp.

PHILADELPHIA IMPORTS

WEEK ENDING MAY 31, 1947

Pulp Sales Corp., Danaholm, Helsingfors, 3800 bls. unbleached sulphite pulp; 270 bls. kraft sulphate pulp; 3810 bls. strong unbleached sulphite pulp; 2720 bls. unbleached kraft sulphate pulp.

Elof Hansson, Inc., Paraguay, Halmstad, 5000 bls. dry chemical sulphite pulp.

San-nap-pak Manufacturing Co., Paraguay, Halmstad, 2500 bls. dry chemical sulphite pulp.

Gottesman & Co., Inc., Paraguay, Halmstad, 1500 bls. dry chemical sulphite pulp.

Bankers Trust Co., Paraguay, Halmstad, 625 bls. dry chemical sulphite pulp.

Wisconsin Employment Keeps Steady Pace

MADISON, Wis.—Comparatively little change was noted during the nine months ended last March in the number of employes in Wisconsin paper and allied products plants, according to a report by the Industrial Commission of Wisconsin. In July, 1946, there were 27,300 employes, and in March, 1947, there were 27,800, with variations in between ranging from 27,200 in September, 1946, to 27,900 in December, 1946, and February, 1947.

Average weekly earnings showed a continuous increase for the first three months of this year: $47.28 in January, $49.08 in February, and $49.11 in March. Average weekly hours: 43.4 in January, 44.1 in February, and 43.9 in March.

In Milwaukee county, 20 plants reported a total of 3,377 employes in March, a decline of 0.7 percent from February. Payrolls declined an identical percentage, amounting to $171,158 weekly during March. Average hourly earnings in March were $1.144 for 44.3 hours. The average weekly earnings were $50.68.

GOVERNMENT BIDS

PROPOSALS

FOR FURNISHING

PAPER AND ENVELOPES FOR THE U. S. GOVERNMENT PRINTING OFFICE

SEALED PROPOSALS will be received until 10 a. m., June 16, 1947, in the room of the Joint Committee on Printing, in the Capitol, Washington, D. C., for furnishing the paper for the public printing and binding, and blank paper and plain envelopes for the use of the Government departments and establishments in the District of Columbia, for the terms of 3 months for paper and 6 months for envelopes beginning July 1, 1947, deliveries to be f. o. b. Government Printing Office Warehouse, or warehouse siding, Washington, D. C. The proposals will be opened in the presence of and the award of contracts made by the Joint Committee on Printing to the lowest and best bidders for the interest of the Government whose bids are in conformity with the requirements of the proposals. The Committee reserves the right to reject any or all bids, or to accept any bid or any part and reject the other part, if, in its opinion, such action would be in the interest of the Government.

Blank proposals containing the instructions, schedule, and specifications may be obtained by addressing A. E. Giegengack, Public Printer, Washington, D. C.

Contracts will be entered into for supplying the quantities required, whether more or less than the estimates, as provided in paragraph 15 of the proposal for paper and paragraph 13 of the proposal for envelopes.

The approximate estimated quantities set forth in detail in the schedules comprise:

PAPER

200,000 pounds newsprint paper; 950,000 pounds machine-finish book paper; 100,000 pounds English-finish book paper; 40,000 pounds machine-finish book end paper; 500,000 pounds offset book paper; 40,000 pounds offset poster paper; 50,000 pounds, antique book paper; 200,000 pounds coated calendered book paper; 1,050,000 pounds coated book paper; 40,000 pounds mimeograph paper; 40,000 pounds duplicator copy paper; 500,000 pounds U S M O safety writing paper; 8,650,000 pounds writing paper; 150,000 pounds map paper; 130,000 pounds manifold paper; 865,000 pounds bond paper; 340,000 pounds ledger paper; 500,000 pounds index paper; 80,000 pounds manila paper; 170,000 pounds kraft paper; 200,000 sheets white gummed paper; 5,000 pounds high-finish red sulphite paper; 10,000 sheets railroad board; 40,000 pounds wood cardboard; 50,000 pounds chemical wood tan board; 5,150,000 pounds postal card paper; 200,000 pounds newsboard.

In cases where more than 1,000 reams are called for, proposals will be received for 1,000 reams or more.

ENVELOPES

The approximate estimated quantities set forth in detail in the schedule comprise:

4,900,000 Kraft; 1,000,000 Writing, Chemical Wood, white and colored; 160,000 100% Writing, white; 500,000 25% Bond, white; 225,000 100% Bond, white.

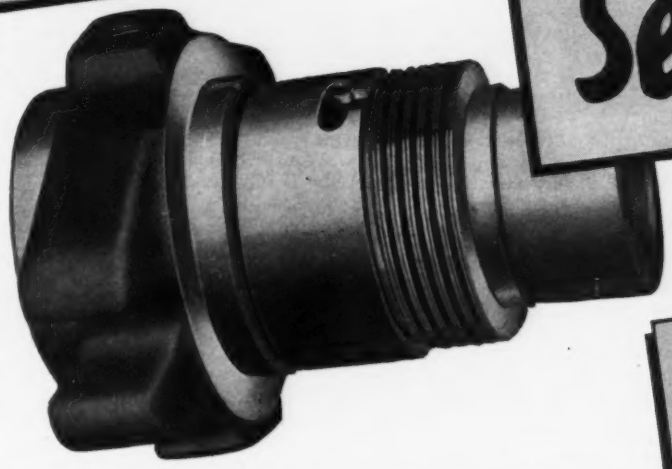
By direction of the Joint Committee on Printing.

A. E. GIEGENGACK,
Public Printer.

WASHINGTON, D. C.,
May 19, 1947

J-5

Refined, Sealed And Delivered



The Cameron Shaft-Seal, applied to I-R pumps, insures better and safer handling of your most troublesome liquids such as volatile and corrosive hydro-carbons. Recent trends to lower and lower specific gravities and higher pressures make this mechanical Shaft-Seal practically mandatory.

The Cameron Shaft-Seal—

- Replaces conventional stuffing-box packing.
- Is easy to install and when installed and set for its operating conditions, requires no further adjustment.
- Is in hydraulic balance with controlled contact pressure between sealing faces. This pressure between sealing faces is comparatively low, permitting its use with high stuffing-box pressures and with liquids having poor lubricating properties.
- Can be used on pumps subject to variable loads or stuffing-box pressures.
- Requires no external lubrication when single seals are applicable.
- Reduces to a minimum fire hazard from volatile liquids.
- Reduces dangers from leakage of toxic liquids.
- Improves operating economy—maintenance is low and power requirements are less.

For further information call your nearest I-R engineer. Bulletin 7100.

COMPRESSORS
AIR TOOLS
CONDENSERS
ROCK DRILLS
TURBO BLOWERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

Ingersoll-Rand

10-937 Cameron Pump Division • 11 Broadway, New York 4, N. Y.

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, June 4, 1947.

The potential market for the consumption of paper throughout the world has scarcely been touched. In the United States, the pulp and paper industry is nationwide with plants in operation in practically every state. It pays annual wages of $366,000,000, has a capital investment of $2,290,000,000, and produces goods valued at $3,240,000,000. In 1946 its products went to about 50,000 printers and to about 200 major publishers and was consumed by over 80,000,000 people. In the United States the per capita consumption of paper and paperboard in 1920 was 145 pounds, in 1937 it increased to 248 pounds, and in 1946 to 319. In Europe the per capita consumption of paper in 1937, the last year detailed world statistics were available, was 56 pounds, but in 1946 it had dropped to 29 pounds. In 1937, the total world consumption was 37 pounds per capita with the balance of the world excluding the United States consuming at the rate of 20 pounds per capita.

The index of general business activity for the week ended May 24 rose to 146.4 from 145.4 in the previous week, compared with 111.3 for the corresponding week in 1946. The index of paperboard production rose to 186.2 from 185.0 in the previous week, compared with 158.3 for the corresponding week in 1946.

Paper production for the week ended May 24 was estimated at 105.1 percent, compared with 105.3 for the preceding week, with 99.2 for the corresponding week in 1946, with 92.0 for 1945, with 90.0 for 1944, and with 91.8 percent for the corresponding week in 1943.

Paperboard production for the week ended May 24 was 101.0 percent of capacity, compared with 102.0 percent for the preceding week, with 93.0 for the corresponding week in 1946, with 97.0 for 1945, with 96.0 for 1944, and with 95.0 percent for the corresponding week in 1943.

In 1937, the consumption of England and Sweden was 150 pounds per capita, that of Russia 12 pounds per capita, Italy 26 pounds, Germany 103 pounds, and of the South and Central American countries—Cuba 24 pounds, Argentina 30 pounds, Peru 7 pounds, Guatemala 2.8 pounds. In Asia and India we have a showing of less than one pound, in the Philippines about 5 pounds per capita and in Japan prior to the war the per capita consumption was 23 pounds. . . . In 1929 world production of paper and paperboard was 25,000,000 tons; 32,000,000 tons in 1937, and 32,500,000 tons in 1946. The production of paper and paperboard in Europe in 1946, however, was estimated at 6,000,000 tons as compared with 12,500,000 tons in 1937, a period of relative stable economy. Thus, it might be stated that in terms of 1946 production and the tremendous reductions in output in all countries except Canada and the United States, worldwide potential demand at present may be in excess of 40,000,000 tons.

The world situation with respect to pulp and paper is entirely different than it was in 1920. The outlook for international trade in general is brighter. International cooperation is far in advance of any similar effort after the last war. And the relative world supply-demand picture for pulp and paper has definitely changed. The possibilities of increased supplies for export from the European countries as a whole are remote. It is probable that the residual tonnage of paper available for export from Europe will constantly diminish. The aggregate production facilities of these countries as a group will not equal prewar levels for many years to come. Meanwhile, paper consumption will undoubtedly increase more rapidly, as demonstrated by the recent increases in Sweden. With most of the world looking toward the United States and Canada for larger paper supplies the paper industry can very well look to the development of increasing foreign markets at a profitable level.

Demands in many of these foreign countries for paper and paper products have already increased far above prewar levels. Purchasing power has risen, as it has in the United States, and paper consumption follows purchasing power. Practical observations alone lead to the conclusion that foreign demands are increasing rapidly. The introduction of mass production, the expansion of local production, and the reorganization of domestic economy are creating a demand for greater quantities of all sorts of paper. Increased knowledge with regard to sanitation and social welfare is resulting in foreign governments insisting upon improved handling of food products, which, among other things, depends upon better packaging. In all countries education is receiving greater attention than ever before with a consequent sizeable increase in the demand for printing papers, as well as books and mazagines published in the United States.

Wood Pulp

Finland, which furnished 14 percent of our total wood pulp imports in the prewar period may be back to almost normal by next year. Her chief present problems are the lack of coal and lack of machine parts. Reports from Finland reflect confidence that with the stimulus of new equipment and supplies available shortly against the credit extended by the Import-Export Bank, pulp production at a normal rate may not be long delayed. Shipments to the United States may soon be coming forward in substantial volume, though appreciably below the prewar tonnages. Estimates place shipments during 1947 at over 200,000 tons, compared with an average of over 300,000 tons before the war.

Inventories at domestic mills at the end of March totaled 478,000 tons; 395,000 tons at paper and paperboard mills and 83,000 tons at wood pulp mills.

Waste Paper

The continued shortage of market wood pulp places greater emphasis on the need for keeping waste paper supplies moving uninterruptedly to paper and board mills. Supplies in most grades, however, are sufficient for mill needs, and more selective packing is now being stressed by consumer mills.

Exports of waste paper for the first quarter of 1947 totaled 53,000 tons; 15,653 tons of overissue news and 36,519 tons of other waste paper, including old newspapers, and 1,128 tons of other paper stock.

Rags

With regard to the possibility of full scale resumption in rag imports from Europe, a continuing shortage of disposable clothing and high ocean freight rates will restrict such exports for the time being at least.

Paper mills at present are using more waste paper and other substitute fibers, including cotton because of the difficulty in obtaining sufficient rags of the better grades at reasonable prices.

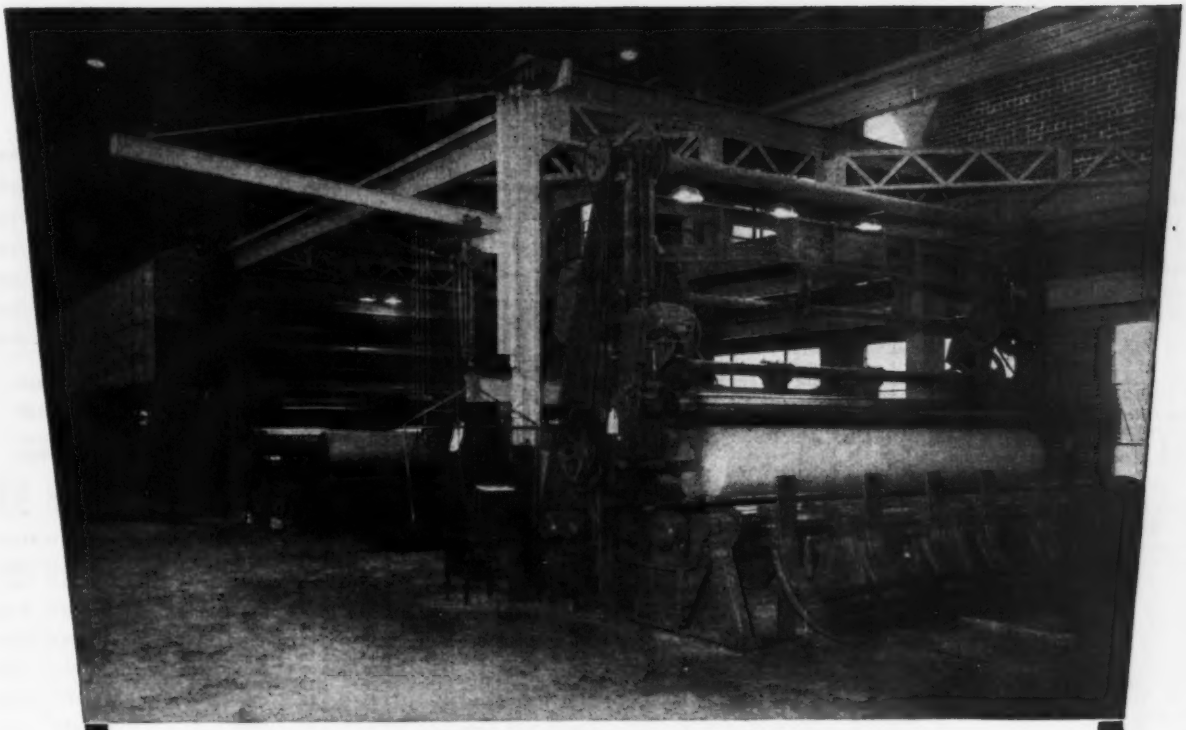
Syracuse Offers Forestry Fellowship

SYRACUSE, N. Y. — The New York State College of Forestry at Syracuse University announces that 24 graduate fellowships from $455 to $1300 are being offered for the college year 1947-48. These fellowships are for students pursuing study for Master of Forestry, Master of Science, and Doctor of Philosophy Degrees.

Recipients of fellowships may specialize in forest botany, forest entomology, forest zoology, wildlife management, silviculture, forest management, forest administration, photogrammetry, forest products, manufacture and utilization, pulp and paper manufacture, wooden chemistry and plastics.

Holders of these fellowships are excused from paying college tuition and fees (approximately $400 annually).

Applications should be made not later than June 25 to Assistant Dean, New York State College of Forestry, Syracuse 10, N. Y.



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BEARINGS THAT HELP KEEP PRODUCTION UP

Dryer section . . . calender stack . . . reel . . . rewinder—all through this 212" Kraft Paper Machine, SKF Ball and Roller Bearings are assuring continuous production. Having rolling alignment, they eliminate the danger of bearing binding from shaft deflections, distortions or weave. Their high capacity enables them to take heavy loads at all times, and they need no adjustments. In the dry end, tending side housings are free to move axially because they are mounted on three rockers for unrestricted expansion and contraction. This, together with the *rolling alignment* of SKF Spherical Roller Bearings, makes sure of dependability, permanent position of the cylinders, reduced starting power, and less strain on the felt. Pioneers of antifriction bearing applications in the Paper Industry, SKF puts the right bearing in the right place. 6271

SKF INDUSTRIES, INC.
PHILADELPHIA 32, PA.

PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

Paper

(Delivered New York)

Standard News, per ton—

Roll, contract	$84.00	to	$90.00
Sheets	103.00	"	109.00

Kraft—per cwt.—Carload Quantities

Zone A, Delivered 40 lb. base weight

Superstandard Wrapping	$7.00	to	—
No. 1 Wrapping	6.50	"	6.75
Standard Wrapping	6.00	"	6.25
Standard Bag	5.75	"	6.25

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.

Wh. No. 1 Frd.	1.35	to	1.65
Wh. No. 1 M. G.	1.35	"	1.65
Wh. No. 1½	1.20	"	1.45
Wh. No. 2	1.30	"	1.55
Wh. Anti-Tar	2.75	"	4.25
Kraft Unbl.	1.45	"	1.85
Manila No. 2	1.25	"	1.45

Toilet—Per Case of 100 rolls—1 M Sheets.

Unbleached	4.47	to	5.50
Bleached	6.50	"	—

Paper Towels—Per Case of 3750—Zone 1.

Wh. C. fold 11x13¼	4.39	to	4.80
Br. Sgl. fold 10 in.	2.67	"	3.00
Br. M'tif'd 9¼x14¾	3.78	"	4.15
Br. M'tif'd 9¼x9¼	2.67	"	3.00

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	to	—
No. 1 Manila 35 lb.	6.00	"	7.00

Boards, per ton—

News	$92.50	"	—
Chip	90.00	"	—
Sgl. Mla. L1 Chip*	102.50	"	—
White Pat. Coated*	120.00	"	—
Kraft Liners 42 lb.*	84.00	"	95.00
Binders Boards	94.00	"	126.00

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1: Rag Content Bonds and Ledgers—

White, Assorted Items

Bonds, per cwt.

	Carton	4 C't'n	Ton
100% Rag Ext. No. 1	$55.00	$50.00	$48.00
100% Rag	46.50	43.00	41.25
75% Rag	35.00	32.50	31.50
50% Rag	31.50	28.75	27.50
25% Rag	28.00	25.50	24.50

Ledgers, per cwt.

100% Rag Ext. No. 1	$54.25	$50.00	$48.00
100% Rag	46.25	42.50	40.75
75% Rag	36.00	33.25	31.75
50% Rag	31.00	28.00	27.00
25% Rag	27.25	24.75	23.75

Sulphite Bonds and Ledgers—White, Assorted Items

Bonds, per cwt.

No. 1	$18.75	$16.25	$15.50
No. 2	17.00	15.25	14.50
No. 4	16.00	14.50	14.00

Ledgers, per cwt.

No. 1	$17.00	$17.00	$16.35
No. 2	17.75	16.25	15.50
No. 4	17.00	15.00	14.25

Free Sheet Book Papers—White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated	$19.40	$18.60
No. 2 Glossy Coated	18.15	17.35
No. 3 Glossy Coated	17.65	17.00

(Per cwt.)	Case	Ton
No. 1 Antique (Water marked)	$14.90	$14.25
No. 2 Offset	15.35	14.70
A Grade E. F.	13.90	13.30
A Grade S. & S. C.	14.40	13.70
B Grade E. F.	Nominal	
B Grade S. C.	Nominal	
C Grade E. F.	Nominal	
C Grade S. C.	Nominal	
D Grade E. F.	Nominal	
D Grade S. & S. C.	Nominal	

Wood Pulp

Domestic mill prices delivered with former OPA freight allowances.

	Per Short ADT
Groundwood	$75.00 to $80.00
Unbleached Sulphite	115.00 " 117.00
Bleached Sulphite	121.00 " 125.00
Bleached Soda	115.00 " 120.00
Unbleached Kraft	112.50 " 120.00
Southern Kraft	90.00 " 102.50

Canadian mill Prices delivered with freight allowances unless otherwise specified:

	Per Short ADT
Select Unbleached Kraft (no freight allowance)	115.00 " —
Unbleached Sulphite	115.00 " 117.00
Glassine Unbleached Sulphite (no freight allowance)	112.00 " —
Bleached Soda	105.00 " 115.00
Groundwood	75.00 " 80.00
Sideruns Pulping News	75.00 " 80.00
Hardwood and Specialty Grades	Nominal

Swedish Quotations

Ex. dock, New York

	Per Short ADT
Bleached Kraft	$150.00 to 156.00
Bleached Sulphite	151.00 " 158.50
Unbleached Sulphite	121.00 " 131.00
Unbleached Kraft	116.00 " 126.00

Finnish Quotations

Ex. dock, New York

	Per Short ADT
Bleached Sulphite	$165.00
Unbleached Sulphite	132.50
Unbleached Sulphite (special grade)	137.50
Unbleached Sulphate	132.50
Unbleached Sulphate (special grade)	159.00

New Domestic Cotton Cuttings

(Prices delivered Mill Plus Dealer's Commission)

White Shirt	$11.50	to	$12.00
Light Silesias	7.50		
Unbleached Muslin	11.50	"	12.00
White Back Blue Overalls	8.25		
Blue Overalls	7.75		
Unbl. Fancy Shirt	4.50	"	5.00
Light Percales	5.50	"	6.00
Light Prints	5.25	"	5.95
Washables	4.00		
Bleachable Khaki	5.50	"	6.00
Unbleachable Khaki	5.00	"	5.50
Cottonades	4.50	"	5.00

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked	$5.00
No. 1 Whites Miscellaneous	4.25
No. 2 Whites Repacked	4.00
No. 2 Whites Miscellaneous	3.50
Blue Overalls	3.75
Thirds and Blues Repacked	3.00
Thirds and Blues Miscellaneous	2.50
No. 1 Roofing Rags	2.20
No. 2 Roofing Rags	2.10
No. 3 Jute Bagging	2.00
No. 4 Brussels and hard back carpets	2.00
No. 5A Roofing Rags	2.00

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings	$6.00 to —
New Mixed Cuttings	6.50 " —
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings	13.00 " 15.00
Fancy Shirt Cuttings	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens	$14.00 to 16.00
No. 2 White Linens	12.00 " 13.00
No. 3 White Linens	8.00 " 9.00
No. 4 White Linens	8.00 " 9.00
No. 1 White Cottons	10.00 " 12.00
No. 2 White Cottons	8.00 " 9.00
No. 3 White Cottons	6.50 " 7.00
No. 4 White Cottons	5.00 " 5.50
Extra Light Prints	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints	5.25 " 5.75
Dutch Blue Cottons	5.25 " 5.50
Checks and Blues	4.00 " 4.25
Linsey Garments	3.00 " 3.75
Dark Cottons	2.50 " 3.00
Old Shopperies	2.50 " 3.00
New Shopperies	2.50 " 3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares	4.50 " 4.75
Heavy Wool Tares	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope	6.00 " 7.00
Domestic Manila Rope	5.75 " 6.50
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings	5.50 " 6.00
Mixed Strings	1.75 " 2.50

Waste Paper

Prices to Mills

(Dollars Per Ton)

F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	@	$120.00
No. 1 Hard White Envelope Cuts	90.00	"	100.00
No. 1 Hard White Shavings, unruled	100.00	"	110.00
No. 1 Hard White Shavings, ruled	80.00	"	90.00
Soft White Shavings, one cut	95.00	"	105.00
No. 1 Soft White Shavings	85.00	"	95.00
Soft White Shavings, Misc.	65.00	"	75.00
No. 1 Fly Leaf Shavings	55.00	"	60.00
No. 2 Fly Leaf Shavings	50.00	"	55.00
No. 1 Groundwood Fly Leaf Shavings	30.00	"	33.00
No. 2 Mixed Groundwood Fly Leaf Shavings	(nominal)		
Mixed Colored Shavings	(nominal)		
Mixed Groundwood Colored Shavings	(nominal)		
Overissue Magazines	(nominal)		
No. 1 Heavy Books & Magazines	30.00	"	37.50
Mixed Books	15.00	"	20.00
No. 1 White Ledger	60.00	"	65.00
New Manila Envelope Cuttings, one cut	100.00	"	110.00
New Manila Envelope Cuttings	65.00	"	75.00
Extra Manilas	35.00	"	40.00
Mixed Kraft, Env. & Bag Cuttings	75.00	"	85.00
Kraft Envelope Cuttings	100.00	"	105.00
Triple Sorted, No. 1 Brown Soft Kraft	60.00	"	70.00
New 100% Kraft Corrugated Cuttings	60.00	"	70.00
No. 1 Assorted Old Kraft	40.00	"	50.00
New Jute Corrugated Cuttings	27.00	"	—
Old 100% Kraft Corrugated Containers	(nominal)		
No. 1 News	19.00	"	20.00
No. 1 Mixed Paper	17.00	"	19.00
Box Board Cuttings	20.00	"	—
White Blank News	75.00	"	80.00
Overissue News	(nominal)		
Old Corrugated	28.00	"	30.00
Mill Wrappers	22.00	"	25.00

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—India	.26	@	.29
Fine Polished—Fine India	.31	"	.35
Unpolished—Paper Makers	.20	"	.26
Tube Rope	.22	"	.27½
Wrapping	.26	"	.33½
Cotton	.70	"	—
(Hard Fiber)			
Mex. Sisal	.21	"	.24
Manila	.33	"	—
(Hemp)			
Polished Hemp	.63	"	—

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings—New White No. 1	.10½	@	.11
New White No. 2	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached	.10½	"	.11¼
Washable Prints	.06½	"	.07
Washable No. 1	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales	.06¾	"	.07¼
New Black Soft	nominal		
Khaki Cuttings—			
Unbleachable Cotton Cuttings	.05½	"	.06
Bleachable Cotton Cuttings	.06½	"	.07
Men's Corduroy	.05½	"	.06
Ladies' Corduroy	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

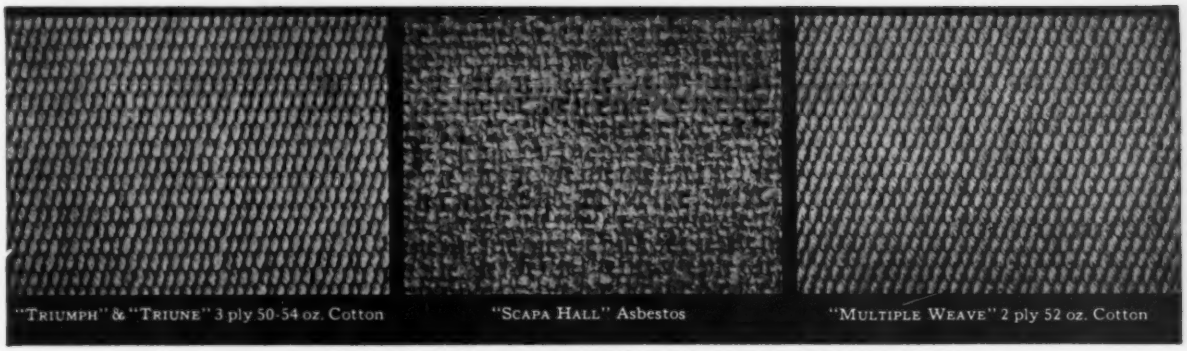
(F.O.B. Eastern Shipping Point)

White No. 1—Repacked	4.50	@	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues—			
Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock—			
Foreign No. 1	nominal		
Domestic No. 1	2.00	"	2.05
Domestic No. 2	1.90	"	1.95
Roofing Bagging	1.90	"	1.95
Old Manila Rope	5.75	"	6.00

Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1—			
Foreign	nominal		
Domestic	4.25	@	4.50
No. 1 Clean Bright—Sisal Strings	.04	"	.04½
No. 2 Clean Bright—Sisal Strings	.03	"	.03½
Sisal Jute	.02¾	"	.03
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.85



"TRIUMPH" & "TRIUNE" 3 ply 50-54 oz. Cotton | "SCAPA HALL" Asbestos | "MULTIPLE WEAVE" 2 ply 52 oz. Cotton

A complete line of Dryer Felts for every kind of paper from finest tissues to heaviest Kraft.

BRANDON CORPORATION

Greenville, S. C.

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"ZEPHYR" Cotton Asbestos | "BAKER WEAVE" 4 ply 48 oz. Cotton | "ZEPHYR" 3 ply 50 oz. Cotton

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WOODWARD, BALDWIN & CO., 43 WORTH ST., N. Y.

Wool Tares, heavy	4.00	"	4.25
New Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)

Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	@	$115.00
No. 1 Hard White Shavings, unruled	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News	60.00	"	65.00
Soft White Shavings	80.00	"	—
No. 1 White Ledger	75.00	"	80.00
Ledger, colored	60.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	45.00
Overissue Magazines	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper	20.00	"	—
Box Board Cuttings	20.00	"	—
Kraft Corrugated Cuttings	nominal		
Old Corrugated	30.00	"	35.00
Overissue News	40.00	"	—
No. 1 News	—	"	30.00

BOSTON

Old Papers

(F. o. b. Boston)

Mill Prices, Baled

No. 1 Hard White Shavings, unruled	7.00	@	8.00
No. 1 Hard White Shavings, ruled	7.00	"	8.00
Soft White Shavings, Misc.	6.25	"	6.50
No. 1 Fly Leaf Shavings	1.65	"	1.80
No. 2 Fly Leaf Shavings	2.00	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	1.25	"	1.50
Mixed Colored Shavings	2.50	"	2.75
New Manila Envelope Cuts, one cut	5.00	"	5.50
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	3.50	"	3.75
Mixed Kraft Env. & Bag Cuttings	3.75	"	4.00
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	2.50	"	2.60
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	4.25	"	4.50
Groundwood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper	—	"	.95
Overissue News	1.50	"	1.75
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.50	"	—
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.25	"	2.50

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	@	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.50	"	—
Domestic	4.50	"	—
Aust. Wool Pouches	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.07	@	.07½
Fancy Percales	.07½	"	.08
New White No. 1	.10	"	.11
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.07	"	.08
New Black Silesias	.05	"	—
Red Cotton Cuttings	.05	"	—
Soft Unbleached	.11	"	.12
Blue Cheviots	.07½	"	.08
Fancy	.06	"	—
Washable	.06	"	—
Khaki Cuttings	.06	"	.07
O. D. Khaki	.07	"	—
Corduroy	.03½	"	—
New Canvas	.06¼	"	.06¼
B. V. D. Cuttings	.10	"	.11

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.90	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$110.00	@	$120.00
No. 1 Hard White Shavings, unruled	105.00	"	115.00
No. 1 Soft White Shavings	80.00	"	95.00
No. 1 White Ledger	55.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	43.00
White Blank News	43.00	"	49.00
Mixed Kraft Env. & Bag Cuttings	75.00	"	85.00
No. 1 Assorted Old Kraft	45.00	"	55.00
Overissue News	28.00	"	—
No. 1 News	25.00	"	—
No. 1 Mixed Paper	20.00	"	—
Old Corrugated	36.00	"	—
Mill Wrappers	22.00	"	—

MARKETS

BLANC FIXE—Demand steady, supplies adequate, deliveries slow. Pulp is currently quoted at $55 per ton, in barrels, car lots, at works; and $60 less car lots same basis.

BLEACHING POWDER—Adequate supplies to meet current demands. Shipments sometimes delayed. Quotations are unchanged. Prices on bleaching powder range from $2.75 to $3.75 per 100 pounds.

CASEIN—Current prices on processed acid precipitated casein are reported around 24 to 26 cents per pound for domestic grades and 28 to 32 cents for imported grades f. o. b. shipping point.

CAUSTIC SODA—Tight market continues, relief expected as new production arrives. Solid caustic soda is reported at $2.50 per 100 pounds; flaked and ground offered at $2.90 to $3 per 100 pounds, car lots, at works.

CHINA CLAY—Demand continues heavy, supply tight. Domestic filler clay is currently $8.50 to $9 per ton, car lots. Coating clay is $12 car lot and $16 less car lot. Imported clay is currently quoted at from $17 to $35 per ton, in car lots, export warehouse.

CHLORINE—Market tight as demand continues strong. Lack of tank cars continues to hamper deliveries. Quotations unchanged. Chlorine is currently quoted at $2 to $3.50 per 100 pounds.

ROSIN—Gum rosin in drums, per 100 pounds, net, in yard New York, car lots, B, D, $10.80; E, F, G, H, I, K, M, $11.80; WG, $12.05; WW, $12.05; Wood Rosin, per 100 pounds, l. c. l. f. o. b. N. Y., B, $7.45; FF, $8.95; G, H, I, $10.25; WW, and X, $10.45.

SALT CAKE—Supplies show little improvement as demand continues to increase. Prices remain unchanged. Domestic salt cake is quoted at $20.00 to $26 per ton in bulk. Chrome salt cake is quoted at $20 to $26 per ton.

SODA ASH—Demand active as supplies continues short, previous orders filled. Contract orders prevail at the same high levels. Current prices, car lots, per 100 pounds, are as follows: in bulk, $1.08; in paper bags, $1.20; and in barrels, $1.60.

STARCH—Domestic demand absorbs capacity production leaving little for export. Starch prices continue strong with the pearl grade quoted at $4.52 per 100 pounds; powdered starch at $4.63 per 100 pounds, car lots, Chicago.

SULPHATE OF ALUMINA — Active demand covered by fair supplies. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f. o. b. works. Iron free is quoted at $1.95 to $2.25 per 100 pounds, in bags at works.

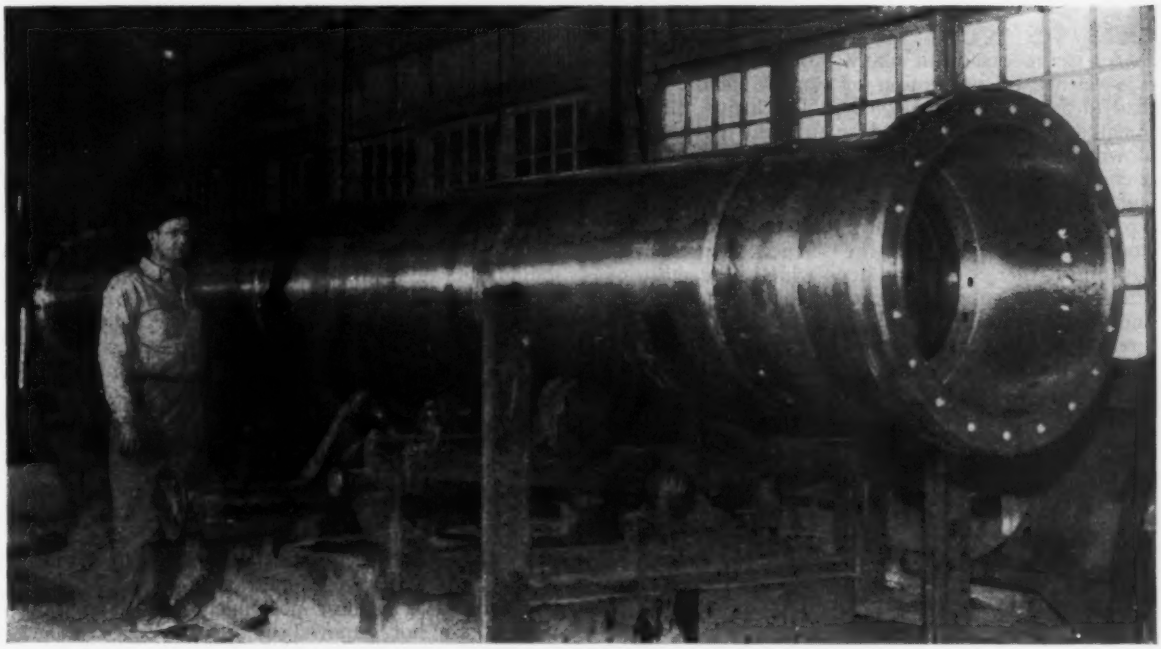
SULPHUR—Plentiful supplies to meet active domestic and export demands. Annual contracts are quoted at $16 per long ton, f. o. b. mines; the price f. o. b. at Gulf Ports is $17.50 per long ton.

TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $35 to $45 per ton. All prices in car lots.

Centrifugally Cast

ACIPCO STAINLESS STEEL

Tubes & Parts



One of several 25%-20% Chrome-Nickel Stainless Steel Retorts furnished to a large chemical manufacturer. Fabricated by electric welding of centrifugally cast tube sections machined 34" O.D. by 32" I. D. by 12'-0" long, and end flange sections cast in stationary sand molds, to make a completed unit 27'-8" long. Completely machined all over. Hydrostatically tested at 300 p.s.i. and air tested at 100 p.s.i. Weight per unit 13,600 lbs.

Extensive facilities permit quantity production of centrifugally cast stainless and carbon steel tubes in diameters from 3.50" to 50" O.D. Wall thickness can be varied to suit specific applications. In addition, alloy cast irons, including the Ni-Resist grades, can be furnished in tubes of the same range of diameters and in pipe fittings. Static sand castings can be furnished from one pound to several thousand pounds.

A new development is ACIPCO Ni-Resist bolts combining high strength with ductility and having high resistance to corrosion. Bolts can be either square or tee-head and are furnished in sizes ⅝" x 3" through 1½" x 7½".

Acipco is fully equipped with modern electric furnaces, complete laboratory and testing facilities, pattern and machine shops to produce and fabricate your casting requirements. Inquiries are invited.

Steel Castings Division

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM 2, ALABAMA

Boiler Water Conditioning to Prevent Turbine Deposits

by C. E. Imhoff, Allis-Chalmers Manufacturing Company

As is the case with many problems, the art and the science of prevention of turbine deposits have had to develop simultaneously. The logical development of the science would be to break the problem down into its essential elements and then study each element individualy and finally correlate all the results. The power-plant engineer, however, is confronted by a problem which will not wait for the complete development of the science of prevention and must, therefore, take steps which bear more of the aspects of an art than of a science. The development of the art, however, is stimulated by the progress made in the science and vice versa. There will be this mutual assistance until the development has proceeded to the stage where the two will merge into what can be considered a true science of the prevention of turbine deposits.

Probably the most obvious way of preventing deposits is to control the boiler water so that the impurities will not be carried over into the steam. That in itself, however, is a complicated problem since it involves the question, "What salts are to be controlled and what are the range limits of this control?"

The study of turbine blade deposits by such means as x-ray diffraction is one way of driving a wedge into the problem where it can be opened up most readily. The identification of the compounds found in deposits and correlated with the various temperature zones in which they are found gives us information with regard to the behavior of the entrained impurities as they are rapidly cooled in passing through a turbine. With a knowledge of the composition of the deposited compounds and conditions under which they were formed, we have a solid foundation upon which to build a theory of the mechanism of the depositing process from the point at which the impurities first entered the stream. It is true that because of lack of fundamental data assumptions must be made which necessarily await verification at a future date.

X-ray diffraction studies of the components of blade deposits indicate that the majority of these materials are well crystallized compounds. From the laws of crystallization we know that these compounds crystallize from solutions which are supersaturated with respect to the deposited salt. We can, therefore, then assume that the solvents carrying these salts either entered the turbine in a supersaturated condition or else became supersaturated as the solutions cooled. The solvents under consideration are either superheated steam or water droplets entrained in the steam or both. In any case the solvent must become supersaturated with respect to the salts and our mechanism must account for the concentration of salts to this saturation value.

This requirement for crystallization is not specific in regard to the solution from which precipitation takes place. The same law holds for the precipitation of solids from gases, solids from aqueous liquids and solids from molten liquids. None of these three possible solution media can be eliminated from consideration in establishing a mechanism for crystallization of compounds on turbine blades.

Consideration of the processes occurring between the boiler and turbine permit considerable speculation on the mechanism involved. In the front drum of a boiler we have a relatively weak solution of sodium hydroxide, sodium carbonate, sodium phosphate, sodium silicate, sodium sulfate and possibly sodium nitrate and sodium sulfite. Large volume of gaseous steam are bubbling up through the water contained in this drum and a certain amount of foam exists on the top of this liquid bed. Depending upon the stability of these foam bubbles, the foam layer may be only a few inches high or it may attain a thickness of a foot or so. When these bubbles break, the collapsing of the film leaves very finely divided droplets suspended in the flow of steam coming up from the water beneath. When these droplets are very small, such as one might expect in fog, the downward effect of gravity is very small compared to the suspending effect of the steam traveling in an upward direction. The smallest most finely divided of these droplets are not removed by mechanical scrubbers and purifiers and pass over into the superheater. This droplet, in passing through the superheater, begins to boil from the increased temperature. Steam is evaporated from its surface and the concentration of salt takes place within the droplet itself. It is well known that dissolved salts increase the boiling point of liquids up to the point of salt saturation. The same phenoma happens in our fog droplet. The salts concentrate until the boiling point of the droplet solution is just equal to the superheated steam temperature. It may be possible that certain soluble salts have become insoluble and have precipitated out of solution in the interior of the droplet. It is also quite probable that this droplet has not gone entirely to dryness for most boiler water contains caustic soda and it is practically impossible to dry caustic soda completely under the high steam pressures to which this droplet is subjected. Let us magnify a droplet and suppose that it contains the following composition before it goes to the superheater:

Sodium hydroxide — 200 ppm
Silica — 40 ppm
Boiling point — 486°F

This is a very dilute solution and far from any solubility limits. Suppose now that the smaller circle represents the size of a droplet after it had passed to the superheater and we would find the composition to be greatly changed, possibly in the order as shown below:

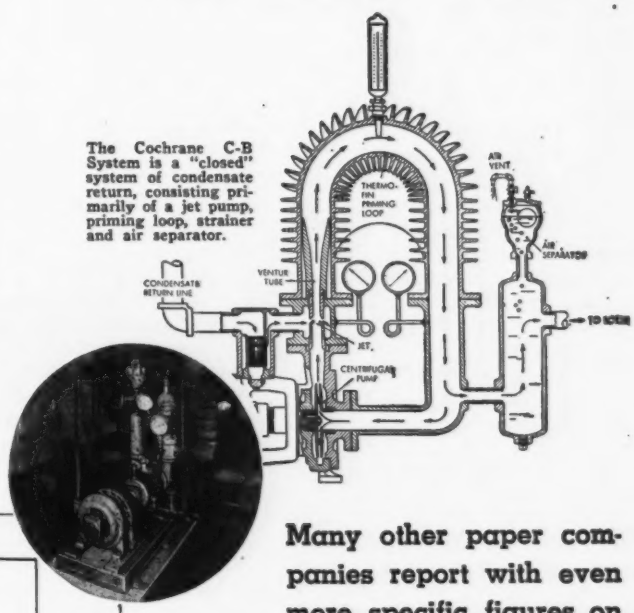
800,000 ppm — Sodium Hydroxide
160,000 ppm — Silica
Boiling point — 800°F

This microscopic droplet is now a very concentrated solution of caustic soda and silica. As it passes

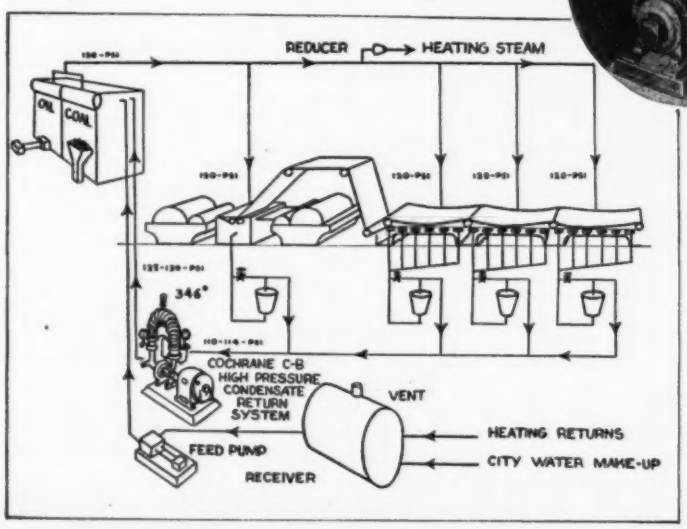
"We run our Corrugator at more uniform speeds and with a smaller percentage of waste"

—says the manager of the box division of a large Southern paper company

A LARGE paper company in the South, manufacturing a line of folding, corrugated and set-up boxes as well as paper bags, envelopes, stationery, etc., recently stated that their installation of a Cochrane C-B System of High Pressure Condensate Return had greatly increased the speed of their operation. The manager of their Box Division wrote, "We find that it has helped us increase our speed considerably on all grades of .030 Liner and run our Corrugator at more uniform speeds and with a smaller percentage of waste."



The Cochrane C-B System is a "closed" system of condensate return, consisting primarily of a jet pump, priming loop, strainer and air separator.



Many other paper companies report with even more specific figures on results obtained by substituting high pressure condensate return in a closed system (Cochrane C-B System) for open condensate return. For example, a corrugated paper company reports, "the speed of both .030 and single-wall and all grades of double-wall was increased in excess of 100 lineal feet per minute."

COCHRANE CONDENSATE C-B BOOSTER SYSTEM

OF HIGH PRESSURE, HIGH TEMPERATURE CONDENSATE RETURN

Write for a copy of Publication 3250

COCHRANE CORPORATION
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through the turbine, it undergoes simultaneously a reduction in temperature and a large number of changes of direction of movement. These directional changes take place much more often than when passing through a scrubber or superheater. The probability, therefore, of contacting a metal surface is much higher. Once a metal surface is contacted, this surface becomes wetted with the concentrated droplet solution. The droplet contains sodium silicate (from sodium hydroxide and silica) which soon reaches a supersaturated state and crystallization begins to take place on the metallic surface. Similar droplets impinging at the same point cause this deposit to grow and finally build up to the thickness to which it can be recognized as a turbine blade deposite. The accuracy of the concentrations shown for the concentrated droplet cannot be checked because of the lack of solubility data for the system $Na_2O \cdot SiO_2 \cdot H_2O$. A solo solution of sodium hydroxide under the above stated conditions would have a concentration of about 90% with no solid crystallizing out. One of the problems is to determine solubility data in complex systems containing all of the boiler-water salts.

The carryover of boiler water droplets, their concentration, and subsequent crystallization of salts therefrom, explains one way in which blade deposits can be formed. There is, however, still another way in which dissolved salts can be carried over into the turbine and that is by means of direct solubility in the steam itself. Professor F. G. Straub at the University of Illinois has measured the solubility of silica in steam coming from a boiler water having various concentrations of sodium silicates. His results show that the solubility of silica increases as the temperature increases and also indicates that there is somewhat of an equilibrium relationship between the silica dissolved in the boiler water and the silica dissolved in the steam. We see that it is, therefore, possible for silica to be present in the steam without the presence of moisture particles to carry it. In passing through the turbine the steam, being rapidly cooled, soon becomes supersaturated with its respective silica and silica begins depositing out.

With this background of information, let us see what conclusions we might reach in regard to boiler-water conditioning to prevent the formation of deposits. Usually in problems involving the prevention of a crystallization reaction, the answer is to keep the concentrations below the solubility limits for that particular salt whose crystallization is undesirable. In the case of turbine deposits, it would mean keeping the concentration of sodium silicate, silica, sodium silicate, silica, sodium chloride and sodium sulfate below their respective saturation levels in the steam. Little is known of the solubility limits of the salts concentrating in droplets, but a tentative limit has been arrived at for silica dissolved in steam. In many plants it has been found that if the concentration in the steam is held below 0.1 ppm, silica deposits will be greatly minimized. There are a few plants where deposits form from steam carrying substantially less than this amount.

The manner in which water droplets become entrained in steam is one of mechanics more than chemistry and the boiler manufacturers have made considerable progress in the design of scrubbers and purifiers to keep entrainment to a minimum. To keep steam concentrations to a minimum it is, therefore, necessary to keep the salt concentrations in the boiler water as low as possible and still operate to keep the boiler free from scale.

Since the diffraction studies show that the major components of blade deposits, in turbines operating at 400 pounds per square inch and higher, are silicates, the first requirement for boiler water conditioning to prevent turbine deposits is to keep the silica concentration below a certain maximum level. This level depends upon boiler pressure and pH value of the boiler water. There are to date no theoretical studies by which this maximum can be derived and the limits drawn from experience are so varied that it is difficult to establish them.

The silica concentration in the boiler many times cannot be controlled in any other way except by controlling the blow-down. Many central stations blow down entirely according to the silica concentration in the boiler. Plants having primary treating systems are able to control silica by removing it in some of the water treating equipment. This is most easily done in hot process lime and soda softeners by employing chemicals containing considerable magnesium. Water supplies containing as much as 58 parts per million of silica have been satisfactorily treated to produce an effluent containing only 2 parts per million of silica. Serious silica scale conditions were corrected as well as silica turbine blade deposits in this particular instance. Silica removal has also been made available through the use of deionizing exchangers employing the use of either sodium fluoride or hydrofluoric acid in the process. In its end results it appears to be more effective than the adsorption hot process as low values of .1 part per million have been reported from experimental columns. Magnesium compounds have also been successfully used to reduce silica internally in a boiler. A large central station operating at 1200 psi has eliminated quartz and amorphous silica deposits by feeding magnesium oxide to reduce the boiler water silica from 20 parts per million before treatment to about 3 parts per million after treatment.

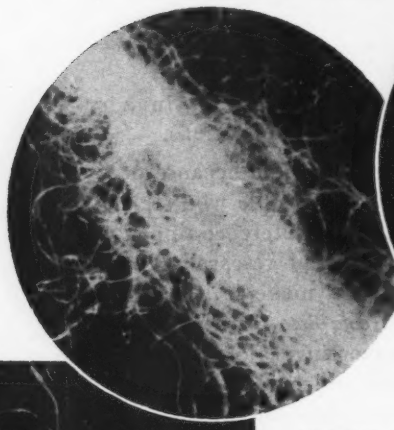
It has been observed that turbine blade deposit difficulties in plants located inland are greater than in those located around the sea coast. The one notable difference between inland and sea coast plants, where sea-water is used through the condenser is that small leakages in the condenser cause chlorides in the boiler water to become higher than would be normal for inland plants. Some engineers have even added chlorides and claim considerable improvement from their use. Another salt which has been added with announced success, is sodium sulfite. Some central stations have added sulfite to maintain a certain sulfite concentration even though it increased the amount of solids in the steam, the total overall crystallization on the blades was less than when no sulfite was used. Again the action of this added sulfite could be similar to that of added salt.

The use of anti-foam materials should be of some benefit in helping to reduce the number of droplets carried over into the steam but they would not reduce the silica which is dissolved in steam.

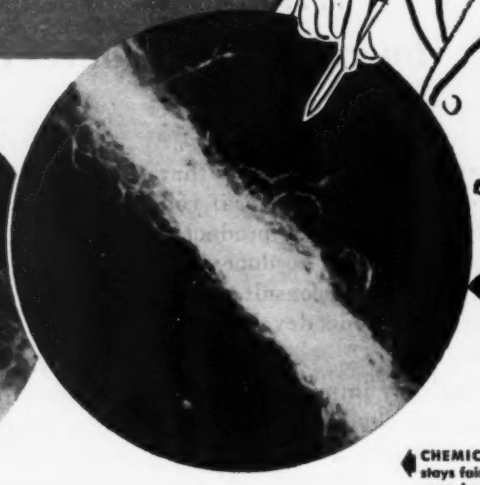
In conclusion, the prevention of turbine blade deposits, particularly those of silica, depends upon keeping the silica concentration in the boiler water sufficiently low so that the concentration in the steam is less than a tenth of a part per million. This may be accomplished by one of several means such as adsorption in precipitation softeners, exchange in de-

AMERICAN ANODE LATICES AND MIXES AMERICAN ANODE LATICES AND MIXES AMERICAN ANODE LATICES AND MIXES

WHY ORR-CHEMS WILL SAVE A MILL MONEY



UNTREATED wool yarn tangles and fluffs, which leads to early matting and slower drainage.



CHEMICALLY-TREATED wool yarn stays fairly straight and in a felt stays open longer; hence, better drainage.

SINGLE STRANDS. Left, treated and fairly straight. Right, untreated and badly curled. In a felt the straighter the strands the more open the felt and the better the drainage.

Get the significance of that! In the average mill a 25% felt saving would total thousands—a felt saving of 50% to 100% could mount to tens of thousands of dollars.

Doesn't such a possibility excite your interest and impel you to action? Wouldn't you like to read what scores of superintendents now using Orr-Chem chemically-processed felts have to say?

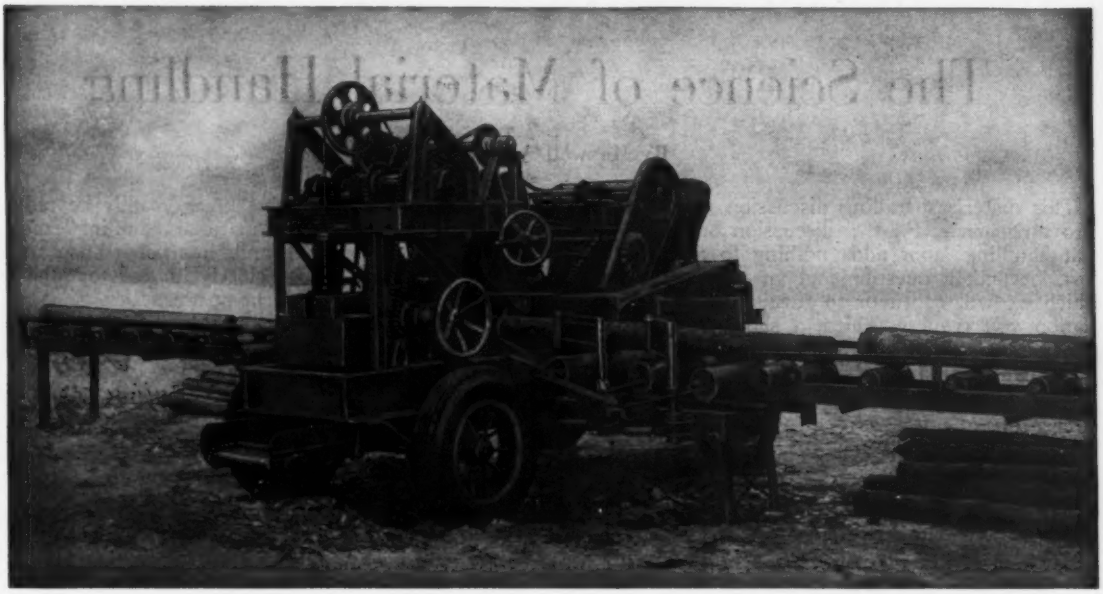
• *Write the Orr Sales Department or call your Orr representative.*

THE ORR FELT & BLANKET CO.

PIQUA, OHIO

ORR-CHEM CHEMICALLY PROCESSED ORR FELTS

Nekoosa Portable Wood Peeler



Produces Peeled Wood—

With less labor

No Wood loss

More Economically

Nekoosa Foundry & Machine Works Inc.

Nekoosa, Wis. **U. S. A.**

ionizing resins, adsorption by material added directly to the boiler and by deconcentration by blowdown. For control of the steam solids other than silica the recommendations of the American Boiler Manufacturers Association serves as a good guide. In regard to the use of added salts such as sodium chloride and sodium sulfite more basic data is needed on their effects in combination with other boiler water salts before they can be generally applied for the purpose of preventing blade deposits. A great deal of useful and practical information can be obtained by correlating boiler water concentrations and ratios with the findings of such studies as x-ray identification of compounds in deposits. Such correlation is now being done by the Allis-Chalmers Company in cooperation with all those in industry who send in samples of deposits and information on the operating conditions under which they were formed.

The Science of Material Handling

By Maxwell A. Goodwin[1]

This material handling discussion will be divided into three parts. First, a discussion of the principle that handling labor adds nothing to a product but cost. Second, a question and answer period during which we will endeavor to furnish additional information you request. Third, a short moving picture showing manufacturing and handling methods in a large airplane manufacturing plant.

Industrial activity might briefly be divided into three groups as follows:

1—The moving of things (currently known as material handling).

2—The construction of things.

3—The planning of things.

Much attention is justifiably being given to the moving of things, or material handling methods, for every obvious reason that this activity involves non-productive costs which may readily be reduced.

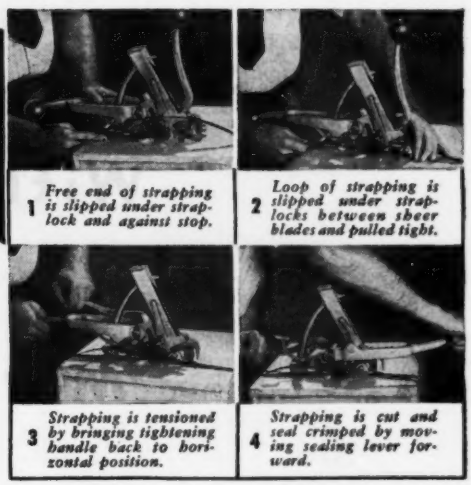
The particular term "material handling" may be divided into external and internal transportation. The two groups are so closely knitted that the progress of each is dependent on the other.

Under external transportation comes our United States distribution system which brings finished products to consumers by means of a large number of repeated handlings. These handlings through storage and transportation processes do not change the quality of a product but certainly do change the final price.

The paper industry group assembled here today is undoubtedly most interested in internal plant transportation and its effect on production costs. Like other industries, paper mills are becoming progressive in their material handling methods and are taking advantage of the fairly obvious savings which may be obtained through reduced handling costs. One of

[1] The Clark Equipment Company.

4 steps... 5 seconds!


1 Free end of strapping is slipped under strap-lock and against stop.
2 Loop of strapping is slipped under strap-locks between sheer blades and pulled tight.
3 Strapping is tensioned by bringing tightening handle back to horizontal position.
4 Strapping is cut and seal crimped by moving sealing lever forward.

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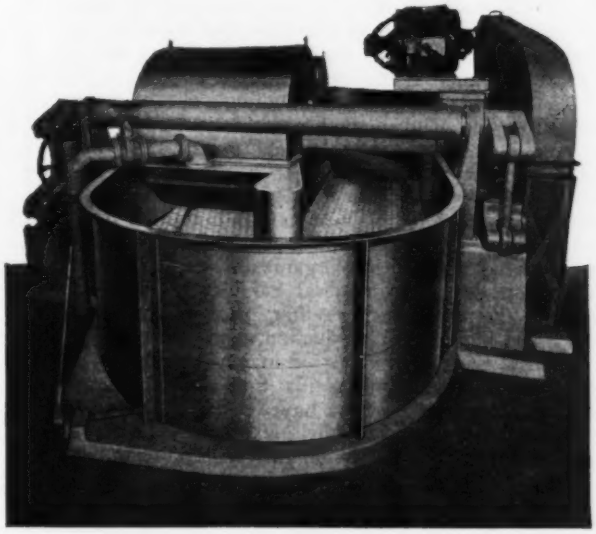

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the handling methods which is most readily adapted to variable conditions and materials is the fork lift truck, pallet and towing tractor combination. The fork lift truck, as you know, is a self-propelled compact unit either gas-powered or battery-powered and equipped with a lifting mechanism for handling skids or pallets. The pallet is a simple skid, or deck, as thin as possible and of as low cost as practicable to be used in conjunction with a fork lift truck. The towing tractor and trailer method is familiar to you all and permits various capacity loads to be moved about an area on trailers.

The steps to be taken to reduce handling costs are relatively simple.

First study the flow of material through the plant.
Second, analyze existing handling methods.
Third, study other methods available.
Fourth, apply the most suitable improved method.

In paper mill handling, one of the big tonnage items is pulp. This product in bales readily adapts itself to being handled by a fork lift truck equipped with tapered smooth forks, which forks may be forced under the load permitting it to be lifted and discharged at will without any skids or pallets beneath the load. Many paper mills are using this method already on their receiving platforms for unloading baled pulp from cars, discharging it on scales, picking it up again and discharging it into storage or to the beginning of manufacturing processes. When large open bay storage areas are equipped with overhead cranes, the fork lift truck readily feeds bales to, and removes them from, the range of the crane.

In some instances, pulp is being handled on pallets and with a regular fork lift truck, where the steps are the same as mentioned for the tapered fork operation, except that material stays on a pallet and is tiered into and out of storage in that manner. Other products handled on pallets include bagged materials such as clay and chemicals. Bulk materials such as chemicals and salt may also be handled with a fork lift truck equipped with a removable scoop attachment. Where long hauls are involved, palletized loads should be placed on tractor trailer trains at one end and removed from the trailers at the other end with a fork lift truck which does not travel the long distance between points of activity. Fork lift trucks in addition may be equipped with roll handling scoops and rotating devices to pick up rolls of paper in any position, and rotating 90 degrees for storage or shipment in another position.

Let me give several specific examples of savings made in handling at paper mills.

1. In one instance the commodity handled was bagged goods. They arrived in freight cars and were unloaded at a cost of $1.10 a ton. When this same operation was adapted to palletizing at the receiving dock, the cost per ton dropped to .39, or a saving of .71 per ton through the use of a fork lift truck.
2. Another example is a general receiving and shipping dock where the crew was reduced from nine men to three men by the use of one fork lift truck.
3. In one instance pulp was unloaded from cars using a crew of six men and requiring approximately four hours or a total of twenty-four man hours per car. With one fork lift truck and two men the same material was unloaded in less than two hours or the equivalent of four man hours. The resulting saving was twenty man hours per car.
4. Another example was handling rolls of paper into cars. The hand method took six men from four to five hours, or approximately twenty-four man hours per car. With a fork lift truck and two men the operation took from forty-five minutes to one and a half hours, or approximately three man hours total, with a saving of twenty-one man hours per car.

Sales and distribution organizations are pressing for action on better material handling in order to improve their competitive selling price. Such groups will assist buyers and production management in coordinating the efficient flow of material through distribution. Particularly at this time when we are moving from a sellers to a buyer's market, purchasing agents may substantially increase profits or reduce costs by diligently applying material handling information already available.

Apparently one of the reasons for slow progress of improved handling methods is a lack of understanding of the large percentage of wages which are paid to handling labor. Current estimates are that an average of twenty per cent of all labor costs are paid for material handling. Improved methods not only result in reducing labor costs but also result in the following:

1. Increased production per employee.
2. Reduced inventories.
3. Improved utilization of existing manufacturing and storage space.
4. Decreased damage to material.

Alert management today is establishing centralized material handling responsibility and authority in their organization. This solution should be given consideration, and when a man is appointed he should be given plenty of authority to coordinate the various departments involved.

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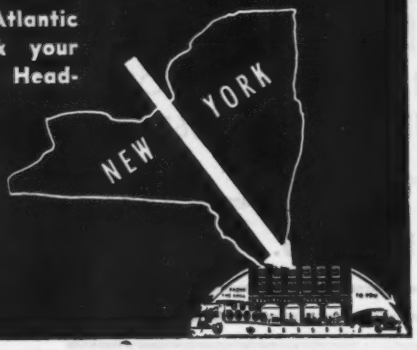

DIGESTED

The trend is sufficiently strong to indicate that increased production of newsprint in 1946 went toward gratifying expanded circulations and greatly increased advertising demands—predominantly among larger publications. Meanwhile smaller jobbers and publishers testified that they were not receiving any portion of the newsprint production increases and were being held to 1945 usage, or lower.

In all fairness it must be stated that not all larger publications have benefited equally. Many publications have shrunk editorial content to provide for additional advertising, and others have maintained their editorial content to the sacrifice of advertising linage.

Other factors have also contributed to a lessened supply of newsprint for smaller publishers. Jobbers have cut off regular small customers to sell at higher prices to new buyers; normal channels of supply have disappeared due to purchase of newsprint mills by larger publishers; and some newsprint mills have converted to the manufacture of other and more profitable types of paper. *From* INTERIM REPORT *of Senator Capehart, Chairman, Newsprint and Paper Shortage Subcommittee.*

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1947		Corresponding Weeks—1946	
April 19	105.9	April 20	102.5
April 26	105.3	April 27	100.6
May 3	107.5	May 4	107.3
May 10	107.9	May 11	102.8
May 17	105.3	May 18	98.3
May 24	*105.1*	May 25	99.2

COMPARATIVE MONTHLY SUMMARIES

1946						1947	
Jan.	94.7	May	100.7	Oct.	106.4		
Feb.	98.4	June	104.6	Nov.	105.5	Jan.	102.1
March	104.4	July	94.0	Dec.	97.0	Feb.	105.9
April	102.7	August	104.7			March	106.1
		Sept.	101.3	Year Avg.	101.1	April	105.1

COMPARATIVE YEARLY SUMMARIES

	1940	1941	1942	1943	1944	1945	1946	1947
Year to Date	86.3	92.4	101.3	89.2	88.4	88.7	100.0	*105.3*
Year Average	85.6	97.4	90.4	87.8	88.1	89.4	101.1	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1947		Corresponding Weeks—1946	
April 19	102	April 20	101
April 26	100	April 27	95
May 3	102	May 4	101
May 10	101	May 11	97
May 17	102	May 18	92
May 24	*101*	May 25	93

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1946	90	91	100	99	94	97	89	99	96	100	99	92	*96*
1947	99	103	101	*100*									

*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

EDITORIAL

Summary

By way of contributing its own measure of cheer over a holiday weekend the United States Department of Commerce presented some morale-lifting thoughts on the immediate prospects of the paper industry. To its findings, as of May 27, that production for the first three months of the year reached record proportions, the Office of Domestic Commerce adds some more cogent observations about supply and demand—observations which deserve repetition here because they may serve as valuable reminders to those who often get one side of a picture, and forget that they have seen the other side previously.

After indicating that the industry is producing at better than a 20-million ton rate, the Department goes on to declare that increased domestic production of paper and paperboard, coupled with imports consisting largely of newsprint, is reflected in a sharp upward trend in apparent total consumption. For the first quarter of this year, on an annual basis, apparent consumption of paper and paperboard was about 24,132,000 tons. This is an increase, on an annual basis, of approximately 3,000,000 tons over first quarter 1946 consumption and of about 1,660,000 tons over the year 1946 as a whole.

There has been some evidence, it is found, of buyer resistance to upgraded and specialty items which have been selling in past months in the higher price levels. However, reports indicate that demand for most grades of paper and paperboard has continued in excess of supply.

The report, prepared by the Forest Products Section, Office of Domestic Commerce, of which W. LeRoy Neubrech is Acting Chief, takes an optimistic view of most production factors in the current industry situation. For example, additional new pulp, paper and paperboard capacity is reported to be progressing more rapidly than a few months ago partly because of some improvement in deliveries of machinery, equipment and construction materials.

A recent report from the United States Pulp Producers Association indicates that wood pulp capacity for 1947 is expected to reach 12,967,000 tons or approximately 800,000 tons more than in 1946. Practically all of this capacity is integrated with paper and paperboard capacity so that as the new equipment gets into operation the industry will be able to step up aggregate production.

Pulpwood procurement is currently and prospectively good, with labor and logging equipment in reasonably good supply. In the South pulpwood receipts have been so heavy that inventories have reached record amounts. Northern mills are wondering whether imported pulpwood from Canada will equal the satisfactory volume of 1946. Imports in the first quarter were about 20 percent below a year ago, largely because severe weather conditions in Eastern Canada made shipments difficult. Waste paper receipts continue at high levels.

As a consequence of favorable pulpwood supplies and new pulp capacity, the report points out, the industry is showing an upward trend in pulp production, reaching a new all-time high in March. Market pulp, however, continues tight and with imports from overseas at a low point, some pulp purchasing paper mills are finding their inventories too low to maintain full production schedules. Market pulp is expected to remain in short supply for some time to come. Latest information from Sweden indicates that deliveries to the United States will be less than anticipated by United States observers earlier in the year.

Production of newsprint in North America continues to maintain the high levels achieved during the latter part of 1946, according to the report. Canadian newsprint mills during March operated at more than 101 percent of capacity for the third consecutive month. Production in both Newfoundland and the United States was lower than in January, but somewhat above the output for the corresponding month last year. Production in all three countries during the first quarter of 1947 exceeded the first quarter output last year by about 10 percent.

The new supply of newsprint made available to United States publishers during the first quarter this year was 14 percent greater than the amount for the same period of 1946. Exports were negligible compared with production or imports and fell 50 percent below those for the same period last year.

"Consumption of newsprint, however, continues to increase at a greater pace than supply," the report states. "Newsprint in the hands of publishers at the end of March represented only 29 days' supply, a drop of 7 days compared with the amount on hand January 31, 1947, and represents an all-time low in the supply situation for any month except March 1946, when stocks also dropped to 29 days' supply."

Early Start

Looking to the future of its forestry problem, and encouraging forest consciousness among the next generation of citizens, British Columbia has taken steps to develop tree interest early. Pulp and paper producers of that province, in cooperation with the Provincial Department of Education and the Department of Lands and Forests, are planning to give each child, as it comes of school age, a seedling with the injunction to plant it. From an educational point of view the movement has been approved for its character-building values.

W. L. Cook

EDITOR

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Postwar Developments with Emulsified Asphalt Sizing in Cylinder Boards*

By E. M. Lorenzini[1]

Abstract

A brief tracing of the history of emulsified asphalt, from its wartime hard sizing uses, through the transition stage to present day domestic uses. Stress is laid on low sizing uses, with a generalized discussion of actual board mill practice, including mention of operational and economic benefits.

The tremendous efforts called for by wars always release and expedite scientific advancements out of urgent necessity. It is a high price to pay but such technical discoveries become the inheritance of the peace, and we employ the inheritance for benefits that accrue to the future.

This presentation reviews briefly the subject of emulsified asphalt sizing, and calls attention to the technological transition from its recent war usages to its present peace time usages. Discussion is confined to multicylinder operations, and the board innovations cited herein are further limited to container or specialty types not impaired by slight color changes.

Use of emulsified asphalt for internal sizing is old art in the literature of papermaking and the subject has been somewhat controversial, even to recent times. Earliest asphalt sizings were actually not emulsions, but merely coarse dispersions with nonuniform particle diameters greatly in excess of colloidal dimensions. Modern manufacture now supplies a uniform product, with particle size within the approximate limits of 1 to 4 microns. Specific treatments of the basic asphalt have led to improved operational stabilities in the usage of the emulsion on the paper machine.

The urgent wartime requirement for highly sized container boards furnished the timely opportunity for the introduction of modern emulsified asphalt sizing. The first-found features were particularly suited to the practical procurance of hard degrees of sizing in cylinder boards, without the usual production penalties. The vast V-board program emancipated asphalt sizing from the old prejudices, and after a somewhat slow start, it became an accepted sizing procedure in a short space of time.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Member TAPPI; Manager, Bitusize Sales, American Bitumuls Co., San Francisco, Cal.

V-Boards

The first of such V-boards made in quantity were run in 1942. This consisted of from three to five-ply solid fiber, employing both liner and filler components containing the somewhat startling amount of 10% asphalt size solids, based on the weight of fiber. Although arbitrary, it was a practical start which revealed some amazing results with regard both to test performance and economy benefits.

In the light of the specifications, sizing of V-board was interpreted largely surrounding high waterproofness, with high strength resistance to both the dry and wet abuses, expected in overseas war time shipping. The sudden introduction of the 24-hour immersion test was something new to the container board industry. Stress was laid on a high ratio of wet-to-dry bursting strength, which, from the viewpoint of board mill economics, required a proper operational balance between fiber furnish and production rates that were seriously affected by hard sizing. In this combination of factors, asphalt emulsion was quickly established, but used principally in the category of high degrees of sizing.

It is not intended to review the supporting data that have been presented in earlier papers *(1,2)*. However, the following statement is significantly mentioned. Asphalt emulsion size, offered the most practical and efficient solution for reaching V-2-S performance, employing cylinder boards that depended solely on internal sizing for their high degree of waterproofness. It was usual to see 24-hour immersion ratios of wet-to-dry bursting strength run in the neighborhood of 85 to 100% strength retention. It was soon learned that 10% asphalt solids rendered test performance in the finished board exceeding the specifications and usage in various mills finally settled at between 4 and 6% asphalt solids content for V-2-S components.

Postwar Use

The V-board history has been mentioned only to establish the background of hard sizing which instituted the volume use of emulsified asphalt size.

The end of the war brought a change in the waterproofing needs of overseas containers. The enormous volume of weatherproof boxes was cut off sharply, and the activity remaining in peacetime overseas ship-

ping containers has been gradually replaced with boards of lesser strength and lesser waterproofness.

This interim started the transition that led to the previously untried realm of moderate or low degrees of sizing. It was a natural step for the various mills to further reduce the percentages of asphalt emulsion being employed. The low percentage has been as interesting as the high contents mentioned above.

For what can be called average present use for domestic purposes, the industry has settled on a range between 1 and 2% of asphalt solids, based on weight of fiber. It is interesting to know that this level of sizing was reached simultaneously through independent work in a number of unconnected mills working under various and different conditions.

The bulk of this newly developed sizing is represented in multicylinder containers and specialty boards, such as kraft and jute liner boards, chipboards, news lined wall board for gypsum plaster liners, and a number of high and low density structural and insulating boards.

Except for the liners, it may be perceived that in the categories named above, there is not too much concern over final color of the boards. Such stocks show little if any discoloration when sized with low percentages of emulsified asphalt. Container boards of kraft, jute and mixed furnishes, sized with from 5 to 10% asphalt solids, took on a brown color, much like some grades of dark kraft. Even higher contents of emulsified asphalt size do not result in a basically black color as the fineness and complete dispersion of the asphalt particles causes only a uniform stain, similar to a dye. However, as used at present, 1% of asphalt solids is not detectable in the average kraft liner. In reworked kraft liners the pale tint of brown resulting from 1 to 2% asphalt solids is in most cases beneficial in causing uniformity of color, tending to "balance up" irregularities of stock furnish. This type of liner sizing results in good smooth finish, with good printing qualities.

In liner operations, it will be recognized also that part of the sizing and the surface finish problem are critically tied to the stock refinement. In the various sized chipboards and specialties employed as fillers for solid fiber, color has little importance. In this category, asphalt size finds favor in boards that are to resist wet abuses, such as refrigeration, icings, etc.

Direct admixture of 1 to 2% asphalt size to light colored liner stocks will show perceptible discoloration. However, filler stocks employing up to 5% of asphalt solids can be successfully covered with normal, single web weights of top liner and preclude show-through of the treated filler stock.

The machine operational values of moderate sizing with asphalt emulsions are largely the same as first noted in hard sizing operations. Foaming is materially reduced, formation is improved, and finished sheets have better test performance. In most instances these properties can be translated into increased machine speeds and increased production.

One of the most significant points regarding low asphalt size content is the cost economics. Asphalt size is inexpensive, not alone on the basis of operational benefits, but also on the basis of pound to pound cost comparisons with other conventional sizing materials. The present low ranges of use (1 to 2%) may range in costs for applications at the beater from 1.00 to $2.00 per ton of finished board, for boards with throughout sizing. In cases where only top liners are sized, the same limits of use may run from 0.20 to $0.30 per ton of finished board. These figures are mentioned only to indicate a broad range of costs, and do not include cost of alum.

Alum is required for precipitation and flocculating, and the requirement varies under differing mill conditions. Costs of alum required for asphalt sizing are about the same as for other types of sizings.

Literature Cited

1. Lorenzini, E. M., *Tech. Assoc. Papers* 28: 293-295 (June, 1945); *Paper Trade J.* 120, No. 18: 39-41 (May 3, 1945).
2. Lorenzini, E. M., *Tech. Assoc. Papers* 27: 342-344 (June, 1944); *Paper Trade J.* 118, No. 21: 36-38 (May 25, 1944).

A. I. E. E. Pulp and Paper Meeting

The American Institute of Electrical Engineers will meet at the Mount Royal Hotel, Montreal, P. Q., on June 10, 1947. Two pulp and paper sessions will be included in the program.

9:30 A.M. Power Supply to Paper Mills:

"Power Tie with Utility," by A. P. Schnyder, George F. Hardy Co.

"High-Voltage distribution in Paper Mills" by G. H. McHenry and J. L. McKeever, Canadian General Electric Company.

"Low-Voltage Power Distribution in Paper Mill" by A. C. Bird, Hardy S. Ferguson Company.

"Automatic Operation of Electric Boilers," by M. Eaton, Shawinigan Chemicals, Ltd.

"Electric Boilers from Utility Standpoint," by L. B. Stirling, Shawinigan Water Power Company.

2:00 P.M. Equipment in Paper Mills:

"The Application of Synchronous and Induction Motors to Chippers" by R. R. Baker and M. R. Lory, Westinghouse Electric Corporation.

"Electrical Equipment for Paper Machines," by H. W. Rogers, General Electric Company.

"Electrical Equipment in the Finishing Room" by F. Winterburn, Howard Smith Paper Mills.

"Electrical Maintenance in a Newsprint Mill," by John Eyton, Abitibi Power & Paper Company.

New England TAPPI Studies Effect Of Paper on Printer

The TAPPI New England Section held its May meeting Friday night, May 16, 1947, at the Roger Smith Hotel in Holyoke, Mass. The speaker for the evening was Mr. R. H. Simmons of the Government Printing Office who spoke on paper and printing.

Most large printing establishments have conditioned press rooms and most printers are aware of the effect of varying humidity on paper. However they can not compensate for wild formation and lack of uniformity.

Mr. Simmons mentioned the difficulties experienced by printers caused by imperfect paper and gave the means by which the printers overcome them.

During the business session the following were elected as officers of the section for next year: Chairman, Chester H. Child, Merrimac Paper Company; Vice-chairman, Philip S. Bolton, Robert Gair Co.; Treasurer, H. T. Barker, Bird & Son; Secretary, T. S. Morse, Hercules Powder Co.; Executive Committee, Percival Gooding, Strathmore Paper Co. and R. H. Mosher, the Marvellum Co., replacing Warner Kaufmann and Mr. Bolton.

Removal of Salt Cake Fume from Sulphate Recovery Furnace Stack Gases By Scrubbing*

By T. T. Collins, Jr.,[1] C. R. Seaborne,[2] and A. W. Anthony, Jr.[3]

Abstract

A new apparatus for scrubbing the fume of sodium salts from sulphate or soda furnace stack gases has been developed successfully on a pilot plant scale. The equipment consists essentially of a venturi through which the waste gases going to the stack pass at high velocity while, at the same time, recirculated water injected into the construction is atomized by the energy of the gases under the extremely turbulent conditions existing in the throat and is then removed in a dry cyclone following the venturi atomizer. Efficiencies of sodium removal of as high as 99% have been attained by a combination consisting of the venturi atomizer followed by the conventional Pease-Anthony Scrubber instead of a cyclone.

The combination of a venturi atomizer folowed by a dry cyclone, called the Venturi-scrubber, has given 85 to 94% sodium recovery on a pilot plant scale with an estimated power consumption for large scale operation of approximately 43 kw. hr. per ton of pulp.

Because of the easily attainable high efficiency, low first cost, and simplicity of operation of the venturi-scrubber, the addition of any other equipment to the combination to improve the efficiency seems economically unjustifiable.

Pulp mills using the sulphate or soda processes long have been aware of the tremendous economic loss represented by the fume of sodium salts issuing from the plant stack when no "after-the-furnace" chemical recovery is employed. In addition, this dusty stack may limit the selection of a new mill site to areas where no public nuisance will be created and, in many cases, has caused unpleasant public relations for those plants located so that the fume is blown out over towns and cities.

These factors have stimulated many attempts to recover the chemicals occurring in the furnace gases. The present shortage of salt cake and soda ash also makes very attractive any reasonable method for reducing the pulp mill consumption of these materials by as much as a third to one half.

The present paper is one of a series being prepared on the various phases of sulphate chemical recovery. Therefore, the historical review of this subject will be presented in a subsequent article. However, in the literature reference is made to four methods of dust collection. Of those which have been tried; namely, the electrostatic or Cottrell precipitator, the wet scrubber, the dry cyclone, and the bag filter, only the electrostatic precipitator has had extensive commercial use in collecting sulphate recovery furnace fume.

The precipitator is said to be characterized by a high initial cost and, in some cases, by large operating costs for labor and maintenance. In its favor are the high efficiency (in practice 85 to 95%) if the unit is not overloaded, and the very low power cost.

Up to this time, wet scrubbers used in conjunction with sulphate recovery furnaces in the United States have been successful only for the evaporation of black liquor and they have not been efficient as fume removers. Some wet scrubbing systems, for example the Inka and Nordstroem systems, have been used in Scandinavia for a number of years. It has been claimed that these are efficient for both the recovery of heat and of chemicals. Recently, in Canada, Tomlinson and his associates *(1)* have applied, apparently, successfully, a modification of a well-known type of scrubber to their soda and kraft recovery furnace stacks.

Dry cyclones have proved ineffective in the removal of sulphate recovery fume because the solid particles are too small to be separated from the gas by the dry centrifugal methods thus far publicized.

Bag fillers apparently have not been studied widely in this connection or have not been considered a worthwhile solution to the sodium loss problem.

Several other methods of recovering salt cake have been studied on a laboratory or pilot plant scale but their results have never been published. An attempt, some years ago, to remove the dust by passing the gas through fine screens gave some very interesting results. Supersonic waves have also been considered. Undoubtedly, still other unpublicized methods have been considered or tried as a solution to this problem because many investigators have been interested in it for years.

In general, it is also justifiable to conclude that electrostatic precipitators and wet scrubbers, such as disk evaporators or spray towers used for the concentration of black liquor, fail to recover a substantial part of the sulphur present as gaseous compounds, or of the heat leaving the chemical recovery furnace. One authority, Tomlinson *(1)*, has stated that approximately 35% of the total heat produced by the combustion of organic material in the furnace is lost through the stack gases. It has also been substantiated that the ratio of total sulphur, in the form of gaseous sulphur compounds and its solid sodium compounds, to total sodium at this point in the sulphate process is greater than the ratio of sulphur to sodium in the salt cake or other makeup chemical.

The whole problem of chemical recovery from stack gases has been obscured by the difficulties occurring in the measurement of the materials and quantities involved. The industry has apaprently made no concerted effort to establish standard

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Member TAPPI; Chemist, Thilmany Pulp and Paper Co., Kaukauna, Wis.

[2] Member TAPPI; Vice-President, Thilmany Pulp and Paper Co., Kaukauna, Wis.

[3] Pease-Anthony Equipment Co., Waltham, Mass.

TABLE I.—COUNT AND CALCULATIONS OF ELECTRON MICROSCOPE PHOTOGRAPH OF SALT CAKE FUME (FIG. 1) CAUGHT BY AN ELECTROSTATIC PRECIPITATOR

Size Groups, microns	Count	Diameter [2]	Weights	Percentages	
			Relative	Group	Cumulative
Minus—0.1	861	1	861	0.7	0.7	99.3
0.1-0.2	82	8	655	0.5	1.2	98.8
0.2-0.3	101	27	2,727	2.3	3.5	96.5
0.3-0.4	85	64	5,440	4.6	8.1	91.9
0.4-0.5	83	125	10,350	8.7	16.8	83.2
0.5-0.6	50	216	10,800	9.2	26.0	74.0
0.6-0.7	31	343	10,600	9.0	35.0	65.0
0.7-0.8	21	512	10,750	9.1	44.1	55.9
0.8-0.9	12	719	8,650	7.3	51.4	48.6
0.9-1.0	22	1000	22,000	18.6	70.0	30.0
1.1	0		0	0		
1.2	4	1728	6,900	5.8		
1.3	1	2200	2,200	1.9		
1.4	1	2750	2,750	2.3		
1.5	7	3375	23,600	20.0	30.0	
					100.0	

	Weight Distribution	Assumed Scrubber Efficiency	Calculated Scrubber Efficiency
Minus 0.5	16.8%	0%	0.0%
0.5-1.0	53.2	50	26.6
Plus 1.0	30.0	100	30.0
		Total	56.6%

methods of measurement and analysis adequate for the determination of sulphur and fume losses and, therefore, discrepancies occur when comparing the work of one investigator with that of another. Some may be surprised to find that the dust from their mill is principally soda ash and not salt cake while the sulphur-bearing gases contain much hydrogen sulphide and little sulphur dioxide. This is contrary to theories often accepted in the past.

It is very probable that a considerable variation in stack losses and in the chemical composition of the material lost will be found from mill to mill, because of differing mechanical equipment and layouts, and particularly because of differing operating practices as to volumes and distributions of primary and secondary air and as to temperatures in the system. However, once the analytical and physical data are available for a plant, then the technical possibilities and the economic desirability of a workable solution to the stack gas loss problem will become apparent.

Scrubber Installation

During the latter part of 1945, the Thilmany Pulp & Paper Company decided to study the problem of removing sodium compounds from sulphate recovery furnace stack gases and to translate certain ideas concerning experimentation into a pilot plant. A survey of the literature showed that the most efficient and practical scrubber appeared to be the Pease-Anthony cyclonic-spray tower. A bibliography and description of this scrubber together with a discussion of the theory of its operation and representative test data for various problems have been given by Kleinschmidt and Anthony (*2*). These authors mention a pilot plant scrubbing unit operating on "chemical fume" which was in reality stack gases from a sulphate recovery furnace, with results of approximately 65% fume removal.

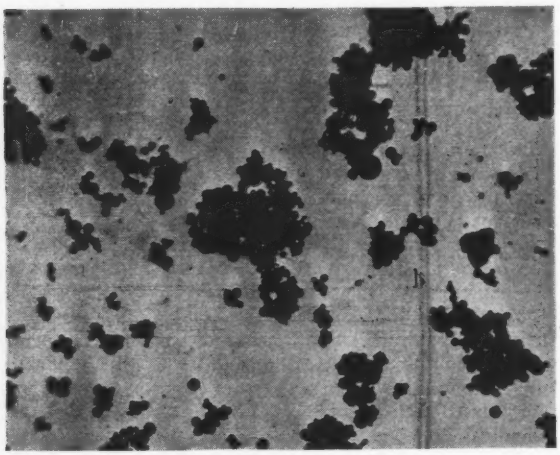

FIG. 1

Electron Microscope Photograph of Sulphate Recovery Furnace Stack Fume Collected by a Commercial Electrostatic Precipitator.

This photograph was made available through the courtesy of Mr. George R. Wadleigh, the West Virginia Pulp and Paper Co., and the Radio Corporation of America

In order to ascertain the possible reason for this unexpectedly low efficiency of removal of salt cake fume, an electron microscope photograph, Fig. 1, was made of a sample of fume collected by a commercial electrostatic precipitator later installed in this mill which was said to have been collecting 85% of the solids content of the gas.

As the precipitated fume particles appear to be spherical, simple diameter measurements were taken and a count (Table I) was made by one of the authors. This calculated efficiency for the different size groups in Table I compares with the efficiencies obtained in the original pilot plant tests. In order to allow a comparison of the particle size range of sulphate recovery fume with other dust, smokes, mists, etc., Table II is given.

After consultation with the Pease-Anthony Equipment Company, the Thilmany Pulp & Paper Company decided to install a pilot plant scrubber of conventional design in their sulphate mill at Kaukauna, Wisconsin, to determine how high an efficiency could be obtained within reasonable cost limits for equipment and power. About 5% of the furnace gas from between the stack and the induced draft fan after disk evaporators was drawn through the cyclonic-spray tower by a fan on the exit side. The treated gas was returned to the stack. This furnace is a 140 ton B & W-Tomlinson unit followed by disk evaporators and an induced draft fan. The total gas leaving the induced draft fan on the furnace averages 60,000 c.f.m. under a vacuum of 1 inch w.g., at 300° F. dry bulb and 163° F. wet bulb. Although some dust losses as low as 60 pounds of salt cake per ton of pulp have been recorded in routine stack tests, it is reasonable to estimate this value at 150 pounds per ton of pulp. The dust loadings of all the pilot plant tests averaged 183 pounds of salt cake (calculated from sodium) per ton of pump.

Figure 2 shows the conventional Pease-Anthony cyclonic-spray scrubber which consists of a cylindrical chamber with a tangential gas inlet near one end and a central gas exit at the other end. A suitable spray of finely atomized droplets of the scrubbing fluid is formed by spray nozzles mounted in a manifold on the axis of the cylinder. The spray zone is the space directly above the gas inlet. Rotation of the gas in the chamber, due to the tangential entrance of the gas at a controlled velocity, generates centrifugal force which causes the spray droplets to travel outward through the gas to the walls of the chamber. The radial motion of the water droplets across the gas stream causes them to collide with the dust particles and carry them to the wall from which they are washed down and discharged from the scrubber.

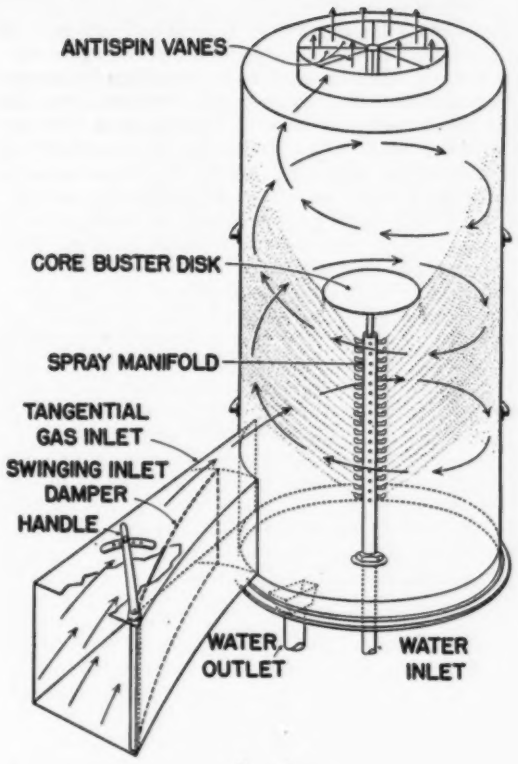

FIG. 2

Schematic View Showing Elements of Pease-Anthony Scrubber

Reprinted by permission from the article by Kleinschmidt and Anthony in the Trans. of the A.S.M.E., May, 1941

Theory of Operation

Kleinschmidt and Anthony (*2*), in discussing the "Collision Theory" of scrubbing, stated that in spray types of gas washers there is a rapid decrease of scrubbing efficiency to be noted in the case of fine dusts, fumes, smokes and mists. They list the various explanations assigned for this phenomenon as the resistance to wetting of the dust particles, an absorbed gas layer which is difficult to penetrate, the repelling effect of similar electrical charges on the dust particles and the spray droplets, and the surface coating of the water droplets by the large number of fine dust particles which each water drop must remove. Their conclusion is that these are decidedly minor effects and for further development of the free-flight collision theory they consider the aerodynamics of the collision of two particles surrounded by a gas. They state "if the two particles are of comparable size the gas has little effect on the collision but, if the particle which is in motion relative to the gas is large, it will be surrounded by a streamline pattern in the gas which will carry small air-borne particles around it without collision." Figure 3 shows this idea pictorially.

The pilot plant Pease-Anthony scrubber was tested over a wide range of gas flows and, although a figure of 85% efficiency of sodium removal from the stack gases was never quite attained, the data indicated that, in a scrubber of sufficiently large diameter, approximately 15 gallons of hot, recirculated scrubbing liquor per 1000 cubic feet of entrance gas would be needed. To attain this efficiency, the liquor would be sprayed at approximately 150 p.s.i. through suitable nozzles. It should be pointed out that such an installation on a full scale for 60,000 c.f.m. of stack gas would require high pressure nozzles of suitable design, liquor filters of the highest quality, a high pressure pump, and a scrubber shell of large dimensions or two somewhat smaller scrubbers.

As the past experience of previous investigators of the Pease-Anthony scrubber had shown that the dust-collecting efficiency of this unit begins to decrease when most of the particles have a diameter of less than 1 micron, it was felt that some additional modification would be desirable to justify adoption of this device, for the recovery of fume from kraft recovery furnace stack gases. The possibility of allowing the stack gases to undergo a slight condensation before the scrubbing operation was not overlooked. It was felt that the fume particles would serve as condensation nuclei and the condensed moisture would increase the size of the particles to such an extent that they could be removed easily in the scrubber. However, as a result of later studies, the conclusion finally was reached that for use in recovering fume of such small particle size the cyclonic spray towers do not offer the simplest solution to the problem.

At the time of the completion of these first tests, a theory based on calculations was advanced which showed that fume particles of 0.1 micron diameter or less have sufficient Brownian movement to be considered as acting like large gas molecules. Included in this "Diffusion Theory" was the idea that filling a gas stream with small scrubbing liquor droplets and allowing sufficient time of contact between the gas and the droplets would allow collisions to take place between solid particles of 0.1 micron diameter or less and the liquid droplets. This possible phenomenon was considered analogous to gas absorption by water droplets.

Although the particle size distribution of the fume from the recovery furnace at Thilmany was not known, it was assumed that practically all the weight of the dust in the gas was represented by particles of diameters between 0.1 and 1.0 micron; too small to be easily removed in the scrubber and too large to be absorbed in the possible manner anticipated by the new theory.

As a simple means for studying this theory was available, it was decided to make the necessary changes in the equipment. During the war years some development work had been carried out on the atomization of oil by injecting it into the throat of a venturi through which air was passed at a high

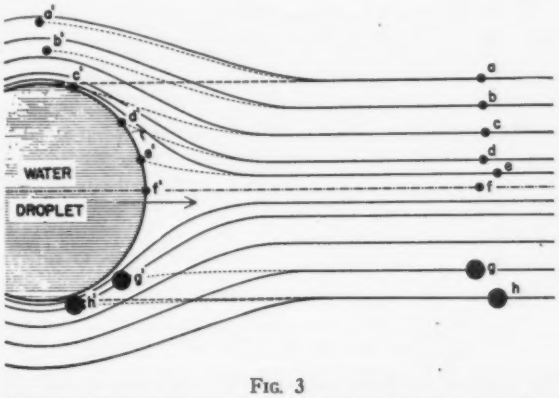

FIG. 3

Collision of moving water droplet with dust particles of various sizes

Reprinted by Permission from the article by Kleinschmidt and Anthony in the Trans. of the A.S.M.E., May, 1941

velocity. It was suggested that drawing the recovery furnace gases through a venturi and injecting scrubbing liquor into the gas through pipes flush with the wall of the throat would fill the gas stream with finely dispersed droplets and provide excellent absorption surfaces due to the high velocity and extreme turbulence adjacent to the liquid at the instant of atomization. For the preliminary experiments, it was decided to allow about 5 seconds additional contact between the dust-laden gas and the droplets, in order to permit the submicroscopic fume particles to collect on the droplets which could then be removed in the scrubber.

Venturi Atomizer

In order to provide a suitable arrangement, a venturi atomizer (Fig. 4) was installed at the point where the scrubber gas supply pipe leaves the main stack duct.

As there was not a sufficient length of ductwork between the venturi atomizer and the scrubber to allow the desired 5 seconds contact, a vertical delay tower was installed with a baffle in the center so that the gas would go up one side and down the other and then into the duct leading to the unit where it would be subjected to the regular scrubbing. The general arrangement of the pilot plant is shown in Fig. 5.

The stack gases from the recovery furnace were drawn out of the main duct through an elbow turned upstream and then through the venturi atomizer. Scrubbing liquid was injected into the gas stream passing through the venturi throat by means of several small pipes located radially around the constriction and flush with the inside of the duct. The energy of the gas moving at a high velocity atomized the scrubbing liquor into very small droplets and filled the throat with spray. The gas stream containing the highly dispersed droplets then passed into the vertical retention tower so that approximately 5 seconds time of contact between the gas and the liquid was allowed for the "diffusion process" to operate. The gas then entered the conventional scrubber where it was scrubbed a second time and the total entrainment removed by the cyclonic action. The volume of saturated and scrubbed gas leaving the scrubber through the spiral pressure regain outlet at the top was measured by a gas orifice before the gas finally entered the fan which returned it to the stack gases in the main duct, downstream with respect to the intake elbow. Gas and dust samples for determining the scrubbing efficiencies were taken at connections before the venturi and after the exit gas orifice. The scrubbing liquor was in most cases a hot, recirculated solution of the fume pumped from a tank to the venturi atomizer and to the spray nozzles of the scrubber. Much of the venturi atomization coalesced and was drained out of the retention tower, and it and the drainage from the scrubber were returned to the storage tank.

A number of test runs with the combination were made with some efficiencies of sodium removal as high as 99%. It was observed that when the scrubber sprays were not used and the unit was used as a dry cyclone to remove the entrainment in the gas from the venturi atomizer, an unexpected efficiency of sodium removal resulted. Under optimum operating conditions, these efficiencies of the venturi-scrubber (consisting of the venturi atomizer followed by a dry cyclone to remove entrainment) were 85 to 90% when the unit was operated on saturated salt cake solution. It was later found that, in the case of the sulphate fume, the delay tower is unnecessary for high efficiencies, and subsequently the equipment was arranged so that the venturi was connected directly onto the scrubber shell which was no longer used for scrubbing but took the place of a dry cyclone.

As to the economics of the venturi-scrubber, it can be said that its maximum power requirement for 90% recovery of salt cake fume appears to be 43 kw. hr. per ton of pulp, which is comparable to the calculated power necessary for the conventional Pease-Anthony scrubber operating on the same gas. It is believed that in a large scale, properly designed unit that this value can be reduced.

The great advantage of the venturi-scrubber is that it does not require liquor filters, high pressure pumps and spray nozzles, and large scrubbers. It consists of a venturi atomizer, followed by a dry

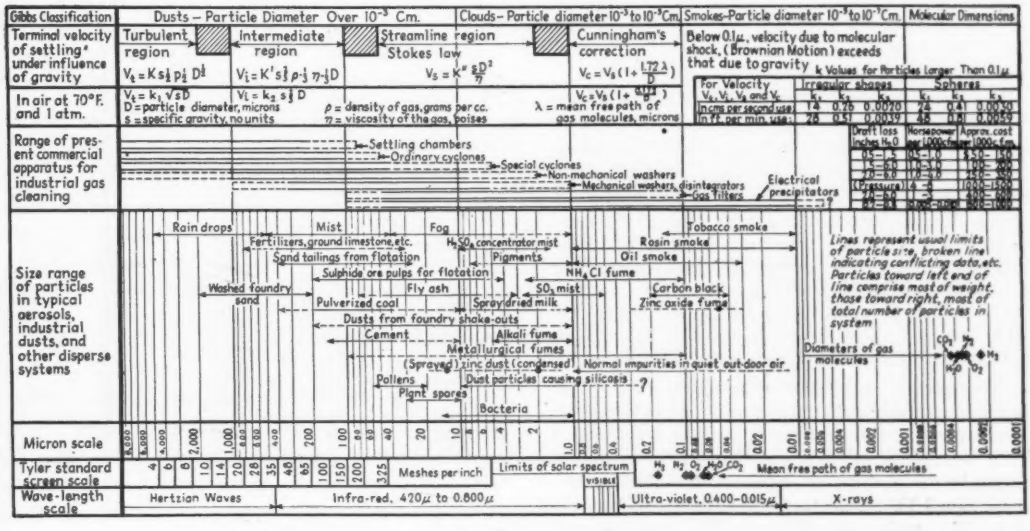
Gibbs Classification
Dusts – Particle Diameter Over 10⁻³ Cm.
Clouds – Particle diameter 10⁻³ to 10⁻⁴ Cm.
Smokes – Particle diameter 10⁻⁴ to 10⁻⁷ Cm.
Molecular Dimensions
Terminal velocity of settling under influence of gravity
Turbulent region
Intermediate region
Streamline region
Stokes law
Cunningham's correction
Below 0.1μ, velocity due to molecular shock, (Brownian Motion) exceeds that due to gravity
In air at 70°F. and 1 atm.
D = particle diameter, microns
s = specific gravity, no units
ρ = density of gas, grams per cc.
η = viscosity of the gas, poises
λ = mean free path of gas molecules, microns
Range of present commercial apparatus for industrial gas cleaning
Settling chambers
Ordinary cyclones
Special cyclones
Non-mechanical washers
Mechanical washers, disintegrators
Gas filters
Electrical precipitators
Size range of particles in typical aerosols, industrial dusts, and other disperse systems
Rain drops
Mist
Fog
Tobacco smoke
Fertilizers, ground limestone, etc.
H2SO4 concentrator mist
Rosin smoke
Sand tailings from flotation
Pigments
Oil smoke
Sulphide ore pulps for flotation
NH4Cl fume
Washed foundry sand
Fly ash
SO3 mist
Carbon black
Pulverized coal
Spray dried milk
Zinc oxide fume
Dusts from foundry shake-outs
Cement
Alkali fume
Metallurgical fumes
(Sprayed) zinc dust (condensed)
Normal impurities in quiet out-door air
Pollens
Dust particles causing silicosis
Plant spores
Bacteria
Lines represent usual limits of particle size, broken line indicating conflicting data, etc. Particles toward left end of line comprise most of weight, those toward right, most of total number of particles in system
Diameters of gas molecules
Micron scale
Tyler standard screen scale
Meshes per inch
Limits of solar spectrum
Mean free path of gas molecules
Wave-length scale
Hertzian Waves
Infra-red, 420μ to 0.800μ
Ultra-violet, 0.400–0.015μ
X-rays

TABLE II

Sizes and Properties of Dust Particles and Fumes

Courtesy of *Chemical and Metallurgical Engineering* (C. E. Miller, March, 1938)

cyclone and an induced draft fan. The work is done by the powerful draft fan which sucks the stack gases through the venturi atomizer at high velocity, resulting in good atomization of the scrubbing liquid injected in the venturi throat through coarse nozzles or pipes. The scrubbing liquor is recirculated until almost saturated and then may be returned to the pulping system as makeup by mixing with the black liquor going to the disk evaporators. With such a simple apparatus, maintenance and operation of a full scale unit should be relatively easy.

A number of problems for further investigation have developed as a result of the pilot plant exploration and their solution can be worked out only on a full scale unit. Only then can be obtained a perspective of the economics of recovering sulphate recovery furnace fume by scrubbing.

Conclusions

The various scrubber combinations were tested over a period of several months and extensive data taken. The general conclusions which can be drawn from these investigations are as follows:

1. By the use of the newly discovered venturi-scrubber, it is possible to obtain a very high efficiency of removal of the salt cake fume from sulphate recovery furnace stack gases. Within reasonable cost limits this efficiency can be 90%.

2. The economic value of the low-level heat recoverable from the saturated, scrubbed gases leaving a mill-scale venturi-scrubber would be considerable, if there is a mill demand for hot water. Many mills may find it feasible to use an auxiliary scrubber-heat exchanger combination to recover heat from the exhaust gases from a venturi-scrubber.

3. If the furnace gases are scrubbed without heat recovery, they will become saturated with water vapor and the result will be a "wet" stack in which rain may occur in cold weather. This is the most apparent technical disadvantage of a venturi-scrubber when compared to a Cottrell precipitator.

4. The economic aspects of scrubbing the stack gases to recover chemicals will differ from mill to mill, depending chiefly upon the chemical losses and costs of power. It has been suggested by various engineers that the low first cost of the venturi-scrubber compared to a Cottrell precipitator will make its installation more attractive to small mills operating on a limited budget even though its power cost is higher.

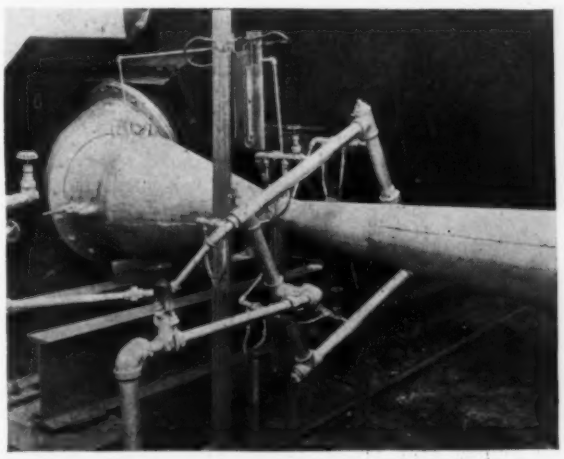

FIG. 4
Venturi Atomizer Section of Thilmany's Pilot Plant Venturi-Scrubber

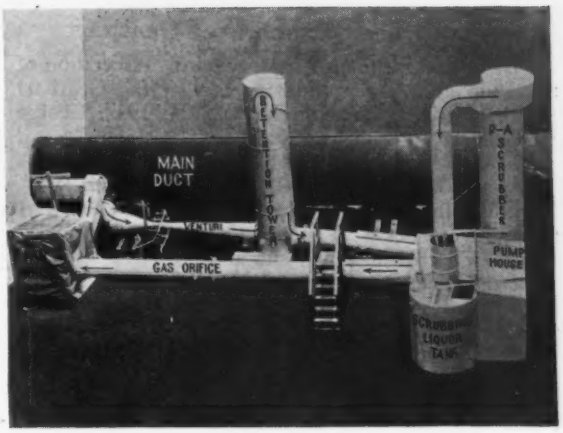

FIG. 5
Pilot Plant Arrangement of Pease-Anthony Scrubber and Venturi-Scrubber

Acknowledgment

The authors wish to express their appreciation to M. G. Schmitt, Janet Playman, and Loyd Broehm, all of the Thilmany Pulp & Paper Company, for help in making this investigation. The assistance of Dr. H. F. Johnstone, Professor of Chemical Engineering at the University of Illinois, who suggests the "Diffusion Theory" for the removal of small dust particles and proposed the use of the venturi atomizer, is gratefully acknowledged.

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1. Tomlinson, G. H., Tomlinson, G. H., II, Swartz, J. N., Orloff, H. D., and Robertson, J. H., *Pulp Paper Mag. Canada* 47, No. 9: 71-77 (August, 1946).
2. Kleinschmidt, R. V., and Anthony, A. W., Jr., *Trans. Am. Soc. Mech. Eng.* 63: 349-357 (1941).

James E. Fenn Opens Consulting Office

James E. Fenn, has opened his office as a chemist and industrial consultant at 529 West 50th Street, New York 19, N. Y.

Mr. Fenn has had more than 20 years of experience in paper-converting, especially in coating, saturating, gumming and laminating of paper and related materials like textile fabrics, films and foils of all kinds. He is experienced and well qualified to render service in the formulation and application of materials which are used for these purposes like starches, dextrines, glues, resins, waxes and synthetic materials in the form of solutions, emulsions and hot-melts. He is able to render assistance in working out formulae for the particular job which will suit best existing equipment or help in re-designing equipment and advise as to what type and kind of equipment will be best suited for the purpose. His experience in helping to run these materials in many plants throughout the country should be valuable to anyone in these lines.

Chicago TAPPI to Hold Outing

The Chicago Section of the Technical Association of the Pulp and Paper Industry will hold its annual outing on Saturday, June 28th. There will be a golf tournament at Deer Park Country Club, Chicago, Ill., at noon, and a picnic at Starved Rock State Park including a boat ride on the Illinois River to Horse Shoe Canyon. Dinner will be held at the Inn.

Pacific TAPPI Meets at Gearhart

The Pacific Section of the Technical Association of the Pulp and Paper Industry met at the Gearhart Hotel, Gearhart, Ore., on May 22-24, 1947. George H. Gallaway presided as chairman.

The following paper was presented on May 23rd—"Strength Evaluation of Pulps" by Conrad Dyar, Rayonier, Inc., Port Angeles, Wash. G. F. Alcorn of the Weyerhaeuser Timber Company, Longview, Wash., reported on mill visits in the South.

At the luncheon Charles F. Walker, President of the Northwest School of Commerce, Portland, Ore. was the speaker.

In the afternoon there were round-table discussions on papermaking gadgets and pulping problems.

On Saturday, May 24th, Boyd Wickwire of the Longview Fibre Company, Longview, Wash., discussed "The Function and Duties of a Personnel Department." Dan McGillicuddy Jr., of Rayonier, Inc., Olympia, Wash., discussed "Safety." Mr. M. Paul of the Crown Zellerbach Corporation, Camas, Wash., discussed "Industrial Testing" and W. J. Shelton of the Longview Fibre Company, Longview, Wash. discussed "Employee Rating."

In the evening R. S. Hatch of the Weyerhaeuser Timber Company, Longview, Wash., presided as toastmaster. The principal event of the evening was the presentation of the Shibley Award by W. E. Brawn, Pejepscot Paper Company, Brunswick, Maine, President of TAPPI. This award was made to Conrad E. Dyar, chemist at Rayonier, Inc., Port Angeles, Wash., for his paper on "Standard Reference Samples in the Pulp and Paper Mill Laboratory. Presentation of volumes of Sutermeister's "Chemistry of Pulp and Paper Making" were presented to the other Shibley Award contestants: Harlan Clodfelter, Crown Zellerbach Corporation, West Linn, Ore., Paul E. Barr, Rayonier, Inc., Hoquiam, Wash., and to Henry Bicker, Soundview Pulp Company, Everett, Wash.

About 300 attended.

Textile Fibers

The fifth edition of Matthews Textile Fibers edited by Herbert R. Mauersberger, technical editor of the Rayon Textile Monthly and in charge of the evening textile courses at Columbia University, has just been issued by John Wiley & Sons. (1133 pp. 6 x 9).

This is an exhaustive, scientifically accurate discussion of all of the natural fibers and the more recent man-made fibers. Each fiber is dealt with separately, and the physical, microscopical, and chemical properties of each are cited.

The reactions of each fiber to organic and inorganic chemicals used in cleaning, mercerizing, bleaching, delusterizing, dyeing, etc. are presented in detail. The review was prepared by 47 leading textile technologists and scientists.

Several chapters deal with cellulose and its derivatives. Included also are chapters on cotton, the bast fibers, hard vegetable fibers, wool, hair fibers, furs, silks, regenerated rayon, new synthetic textile fibers, inorganic fibers and filament, fiber identification methods, quantitative fiber analysis and fiber-testing methods.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $12.50 per copy.

Maine-New Hampshire Program

The program for the Maine-New Hampshire TAPPI Section meeting, as finally released by the committee in charge, promises two full days of interest. It is as follows:

Friday, June 13th

9:30 A. M. Registration.

10:00 A.M. Annual Business Meeting and Election of Officers.

11:00 A. M.

1. A study of Drier Operation Failures, by Harry. M. Spring, Jr., Mutual Boiler Insurance Company of Boston.
2. A report on the Gearhart Seminar (Joint Meeting of TAPPI Pacific Section and the Superintendents Association) by Worthen E. Brawn, President of National TAPPI.
3. Equipping a Paper Chemicals Application Laboratory, by George E. Niles, Monsanto Chemical Company.
4. Instrumentation used in Pulp and Paper Applications, by W. S. Yunker, Foxboro Company.

1:00 P. M. Luncheon.

2:30 P. M. Golf Tournament.

3:00 P. M. Ladies Bridge Tournament

(Other sports: Horseshoe Pitching, etc.)

7:00 P. M. Banquet in Main Dining Room.

1. Paper Packaging, by Mason T. Rogers, Dewey and Almy, Chemical Company, President of Packaging Institute.
2. Awarding of prizes.
3. Motion Picture: "Paper Pacemaker of Progress," presented by W. C. Stroud, F. C. Huyck Company.

Saturday Morning, June 14th

9:45 A. M.

1. The Aims and Objectives of the Northeast Pulpwood Research Center, by Harry A. Bishop, Manager of the Northeast Pulpwood Research Center.
2. Pressure Measuring Devices for Special Application, by J. E. Hart, Taylor Instrument Companies.
3. Application of the Brown Electronics Potentiometer in the Paper Industry, by H. A. Sholl, Brown Instrument Company.
4. pH Control In the Paper Industry, by E. D. Moiles, Leeds and Northrup Company.

1:00 P. M. Lunch.

There will be an exhibit of various mill instruments during the sessions.

For those who wish to make reservations for over the week-end it is suggested that they be made at the Mansion House at Poland Spring as there is another convention starting Saturday night. Rooms at the Poland Spring House must be vacated by Saturday noon.

Kalamazoo TAPPI Golf Outing

The Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry will hold its annual golf outing at the Gull Lake Country Club, Kalamazoo, Mich., Thursday, June 12th at 1 p.m. There will be a dinner at 7 p.m.

Modern Water Chlorination*

By L. L. Hedgepeth[1]

Abstract

The 1947 concept of water chlorination is outlined with essential improvements and process chemistry as a background. Chlorination today should be directed towards selected residuals as indicated by process needs. These may be "free," or "combined," or a combination of the two. Needs for future studies are outlined.

During the 22 years of the author's interest in water purification, many improvements have been made in the art and science of water chlorination. It has evolved from the relatively simple, not too well understood practice of 1925 into today's efficient processes. These are amenable to precise control. In addition to its major function of disinfection, chlorine is now used as an aid in coagulation, reduction of tastes and odors, removal of iron and manganese, control of slime and other microorganisms and abatement of corrosion from biological origin.

In 1925 one simply added chlorine at or near the end of the purification process until an ortho-tolidine residual was obtained. Frequently no standards were employed except the attainment of a "lemon yellow" color in any handy tube or bottle. Variations in results and the ofttimes unpleasant after effects were accepted. That year saw the birth of superchlorination which was followed by much evaluation work by several careful men. As a result it is possible today to prescribe chlorination practice to fit various needs and to effectively control the process and satisfactorily measure the results. The causes of most, but not all of the variables have been determined. There is a better understanding of what happens when a little chlorine is added to water.

The First Fifty Years

Jewel started water chlorination in 1896 at Louisville, Ky. Faber *(1)*, in an address last November divides the elapsed fifty years into five periods of progress.

1st. 1896 to 1906, the experimental use of chlorine and the inception of it as a continuous treatment method.

2nd. 1906 to 1916, the acceptance of it as an integral part of water processing.

3rd. 1916 to 1926, is described as a "learning how" period. Group consciousness of its variations developed and deficiencies in basic information of its mode of action became apparent.

4th. 1926 to 1936, the "action" period, during which it became generally required, even for the smallest supplies. Also, the "ammonia-chlorine" method was developed to correct some of the deficiencies of plain chlorination.

5th. 1936 to 1946, a period of refinement, distinguished by important studies of fundamental factors which work has unlocked closed doors of information and has given us a better understanding of its action and considerable improvement in application.

Today, in the beginning of the 6th decade there are better tools, techniques and knowhow.

Faber, Griffin, Chamberlain, and Calvert *(2,3 4)* by painstaking studies, have so supplemented the understanding of chlorination chemistry that doses of magnitude, as would have been held heretic in 1925, are common practice at this time. It is known now that if one expects to obtain best results from chlorination, it is often necessary to add enough chlorine to complete certain fundamental reactions.

The OTA test work of Hallinan and Gilcreas *(5)*, together with Laux's "flash" technique, have given much better plant and laboratory control of chlorination. The OTA modification of the orthotolidine test, proposed by Hallinan in 1944 *(6)*, and published in the 9th edition of *"Standard Methods" (14)*, is the first real improvement in this essential control since the development of color standards by Ellms and Hauser in 1913 *(7)*, and the demonstration of their practicability in 1918 by Wolman and Enslow *(8)*.

The efficiency of chlorine action in water, particularly disinfection, is a function of the composition of the chlorine residual, without regard to the chlorination process in use. On this basis all water chlorination today should be identified as either "combined residual chlorination" or "free residual chlorination" or, in some cases, combinations of these two.

The up-to-date water chemist will study his system needs and produce, in the water being processed, a type of residual which will accomplish the desired chlorination objective.

Definition Terms

With this expansion of knowledge and applications, more exact meanings of the various water chlorination terms have become desirable. These definitions have been proposed by the authors of the water chlorination chapter in the revised edition of the AWWA Manual now under preparation *(9)*:

"Plain Chlorination" is defined as the single application of chlorine to an unfiltered water supply as it enters the distribution system or pipe line leading thereto.

"Pre-Chlorination" is defined as the application of chlorine to a water prior to filtration.

"Post-Chlorination" is defined as the application of chlorine to a water after filtration or subsequent to pre-chlorination.

"Re-Chlorination" is defined as the application of chlorine to a water at one or more points in the distribution system following previous chlorination treatment.

"Chlorine-Ammonia Process" is defined as the application of chlorine and ammonia to water, or of ammonia to water containing chlorine, to provide combined residual chlorination.

"Combined Residual Chlorination" is the application of chlorine to water to produce with the natural or added ammonia a combined available chlorine residual, and to maintain that residual through part or all of a water treatment plant or distribution system.

"Plain Chlorination" has been previously covered under "Points of Application."

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"Free Residual Chlorination" is the application of chlorine to water to produce directly or through the destruction of ammonia a free available chlorine residual, and to maintain that residual through part or all of a water treatment plant or distribution system.

"Break-point Process" is the application of chlorine to water containing free ammonia to produce free residual chlorination.

"Super- and De-Chlorination" is the application of chlorine to produce free residual chlorination in which the free available chlorine residual is so large as to require dechlorination before the water is used.

"Dechlorination" is the partial or complete reduction of residual chlorine in a water by any chemical or physical process.

"Chlorine Demand" is defined as the difference between the amount of chlorine added to the water and the amount of residual chlorine remaining at the end of a specified contact period. For any water it will vary with the amount of chlorine applied, the time of contact, and the temperature.

Chlorination

The improvements of process understanding outlined previously permit planning in advance to obtain the desired effect of chlorination. If coagulation aid, or taste and odor control, or efficient disinfection are needed, one will seek to obtain a free chlorine residual. If persistent residuals, or maintenance of residual in the presence of chlorine absorptive material are desired, the selection of a combined chlorine residual is indicated. Under some conditions a mixture of the two will be the best.

When a combined available chlorine residual is desired, the characteristics of the water will determine whether it can be produced by applying chlorine alone, the chlorine-ammonia process, or ammonia alone. If the water always contains sufficient free ammonia to maintain a combined available chlorine residual of the desired magnitude, then the application of chlorine alone will be required. If the water contains no ammonia, or too little to maintain a combined available chlorine residual of the desired magnitude, then chlorine-ammonia treatment is indicated. If the water contains free available chlorine and it is desired to convert this residual to combined available chlorine, then the application of ammonia will be necessary.

When a free available chlorine residual is desired, the characteristics of the water will determine whether it can be produced by applying chlorine alone, the break-point process, or the super- and de-chlorination process. If the water contains no free ammonia, then the application of chlorine alone will be required. If the water contains sufficient free ammonia to result in the formation of a combined available chlorine residual, then the break-point process or super- and de-chlorination process will be required.

When a small dose of chlorine is added to water containing organic substances, it combines with them, forming addition and substitution compounds. The residual produced is predominantly combined residual chlorine. As larger amounts are added the chlorine demand increases and the residual may include some free available chlorine. When sufficient chlorine has been added to produce a residual in which free available chlorine predominates the oxidation potential has been increased to the point where oxidation of the organic substances proceeds. Under favorable conditions these substances, instead of forming odoriferous compounds with chlorine, are oxidized or converted into less complex substances of less objectionable nature.

Chlorine, the most widely used bactericide for water, can thus be made to substantially eliminate its most objectionable effect, namely, that "chlorine cocktail" flavor. This point where substitution or addition products cease to form, or are destroyed, has been aptly termed "the breakpoint," being suggested by the characteristic break in curves obtained by plotting the applied dose against the residual after a constant contact period.

The progress of the reactions of chlorine, in water containing large concentrations of organic and reducing substances, may be observed if chlorine doses of increasing magnitude are applied to a series of aliquot portions of the water sample and if the chlorine residuals are determined after a definite period of reaction time. When the residuals resulting from higher doses of chlorine do not increase, the approach of complete oxidation is indicated. Subsequent increase in chlorine residuals, equivalent to the increased chlorine dose added, then indicates that the oxidation reactions have been completed.

Interested chemists, not familiar with these residuals and their identification, may satisfy their curiosity by setting up a series of chlorinated water samples representing free residual chlorine, combined residual chlorine and a combination of the two. One method which may be employed in such tests has been devised by the Chlorine Institute *(10)*.

This employs distilled water with known quantities of nitrogen added as ammonium chloride. The pH and ammonia-chlorine ratio are varied in order to produce the desired type of residual for study. It should be noted in this connection that surplus chlorine is required to destroy the nitrogenous chlorination inhibitors. If this surplus is not provided, the residual will substantially consist of combined residual chlorine. Further, if the pH of the water after chlorination is substantially below 6.5, the nitrogen compound destruction by chlorine is greatly retarded and residual effects after 1 hour will show predominance of combined available chlorine rather than the desired presence of at least 85% of the residual as free available chlorine. The reasons for these phenomena will be understood better after study of the typical chlorination reactions shown later in this paper.

The technique of the OTA test used for the essential measurements in such studies has been previously published *(5, 6)* and will be familiar to technical readers.

Effect of Chlorine Addition

The primary purpose of the addition of chlorine to water is to destroy bacteria and other microorganisms. The mechanism of this action has been the subject of much conjecture and numerous theories have been evolved concerning what actually takes place. In the early period of chlorination of water, the hypothesis was generally held that chlorine reacted directly with water to produce nascent oxygen which, in turn, had a definite bactericidal effect by its action on the cell. This theory has been found to be fallacious since it has been demonstrated that bactericidal effect is not proportional to the concentration of the nascent oxygen produced. Later it was generally acecpted that the reaction is a physico-chemical one. The cell wall structure and the cell contents

contain proteins and amine groups with which the chlorine would react. This action altered the chemical characteristics of the cell contents and destroyed life—or caused disintegration of the cell structure.

In 1946 Green and Stumpf *(11)* made an important addition to the knowledge of the mode of action of chlorine as a bactericide. It is the latest and most tenable explanation. They demonstrated that the trace level at which chlorine destroys bacteria implies that it is an enzymatic process. Chlorine was determined to be robbing bacteria of the power to oxidize glucose. Once this power is lost, the bacterial cells die and the reaction is not reversible.

Any change in the state of the chlorine which reduces its oxidation potential as, for example, its reaction with ammonia or ammonia derivatives to form combined chlorine residuals, reduces the rate with which it destroys bacteria and decreases its effectiveness as a disinfecting agent. The bactericidal efficiency of chlorine and chlorine compounds is dependent upon the same factors that govern its chemical action, namely, reaction period, temperature, hydrogen-ion concentration, the concentration of chlorine and of chlorine consuming compounds. Thus, increase in temperature, reaction time, or concentration of chlorine increases the bactericidal properties. The killing power diminishes markedly with increasing pH values due to the increasing concentration of hypochlorite ion rather than hypochlorous acid. When the effect of lower temperature is combined with a high pH value, the reduction in bacthericidal efficiency is great. Increase of the pH to values greater than 8.4 causes a very considerable decrease in the rate and activity of the disinfection action.

In 1939, Faber and Griffin *(2)*, experimenting with super-chlorination, presented data showing that some waters exhibit a break in the chlorine residual curve, providing a sufficient amount of chlorine is applied to the water and the contact time is adequate. In 1940, Calvert *(3)* and others proved this "break-point," the point of minimum residual, to be primarily dependent upon the ammonia content of the water. The theoretical amount of chlorine required to arrive at the "break-point" has been variously reported to be 7.5 to 10 times the ammonia-nitrogen content of the water. In practice, due to the presence of organic matter, approximately 10 to 25 times as much chlorine as the ammonia-nitrogen content may be required to reach this point. When sufficient chlorine is added to water to produce a residual of chlorine beyond the "break-point," the residual is predominantly free available chlorine with all of its attendant advantages.

Such oxidation by chlorination helps produce a pleasing water in addition to improving the bactericidal efficiency of the plant. It should not be considered as a suitable replacement for sound treatment, basin and filter maintenance, good control and the other items of good operation which jointly result in a safe, pleasing water. It is not a cure-all.

Reactions of Chlorine in Water

Chlorine reacts with water to form hydrochloric acid and hypochlorous acid. The hypochlorous acid ionizes or dissociates into hydrogen ions and hypochlorite ions. Both reactions are dependent upon the pH value of the water, the first reaction predominating at low pH values and the second at high pH values:

$$\begin{matrix} Cl_2 + H_2O = HCl + HOCl \\ HOCl = H^+ + OCl^- \end{matrix}$$

When chlorine is added to water, therefore, a portion of it may be present as molecular chlorine (Cl_2), or as hypochlorous acid (HOCl), or as hypochlorite ion (OCl^-), and may be designated as *free available chlorine.*

The chemical activity of chlorine is a function of its capacity to combine with organic matter, and to oxidize or supply oxygen to reducing substances. The intensity with which any oxidizing agent enters into chemical reaction is measured by its oxidation potential. Chemical reactions which occur when chlorine is added to water, and the rate at which they proceed, are dependent upon the oxidation potential of the free available chlorine.

When chlorine combines with other substances its oxidation potential is reduced or may be completely neutralized. Chlorine reacts with ammonia to form chloramines and with other organic nitrogen compounds to form chloro-derivatives. With many forms of organic matter, particularly the hydrocarbons, chlorine addition products are formed. Those chlorine compounds, lower in oxidation potential than free available chlorine, may be designated as *combined available chlorine.*

After free residual chlorination of a water, the residual which remains must consist almost wholly of free available chlorine and must contain little combined available chlorine. Apparently the true chloramines are first formed when water containing free ammonia is chlorinated by this process but, because chlorine is present in excess, they form intermediate compounds and are destroyed as the reaction goes to completion. Thus, the reactions of the process are explained by the chemistry of the chloramines, that is, the reactions of chloramines in an excess of chlorine. The chloramines first formed may exist as long as ammonia is in excess but are decomposed when chlorine is in excess. The final reactions that may occur are as fololws:

(1) At pH 9.0 when an excess of chlorine reacts with monochloramine (NH_2Cl).

(a) $12NH_2Cl + 24Cl_2 \rightarrow NH_2Cl + 11NHCl_2 + 11HCl + 13Cl_2$

(b) $NH_2Cl + 11NHCl_2 + 13Cl_2 \rightarrow 10NHCl_3 + 13Cl_2 + N_2 + 3HCl$

(c) $10NHCl_3 + 13Cl_2 + 5H_2O \rightarrow 5N_2O\uparrow + 20HCl + 13Cl_2$

(2) At pH 4.5 to 5.0, when an excess of chlorine reacts with dichloramine ($NHCl_2$).

(a) $6NHCl_2 + 3NH_3 + 24Cl_2 \rightarrow 7NHCl_2 + 2NH_3 + 22Cl_2 + 2HCl$

(b) $7NHCl_2 + 2NH_3 + 22Cl_2 \rightarrow 5NHCl_3 + 2NH_3 + 20Cl_2 + 2NCl_3 + 2HCl$

(c) $5NHCl_3 + 2NH_3 + 20Cl_2 + 2H_2O \rightarrow NHCl_2 + 2NH_3 + 20Cl_2 + 2N_2O\uparrow + 8HCl$

(3) At pH values in the range between 4.5 and 9.0, when an excess of chlorine reacts with a mixture of monochloramine and dichloramine, combinations of the reactions given under (1) and (2) will occur.

The above reactions serve to explain the composition of the residuals which result in the application of the break-point-process. When the pH value of the water is relatively high, the final residual is shown, on the right of equation 1c, to consist entirely of free available chlorine (represented in this equation as Cl2 rather than as HOCl.) When the pH value of the water is relatively low, the final residual is shown, on the right of equation 2c, to consist almost entirely, but not wholly, of free available chlorine. These reactions illustrate that ammonia may not be completely removed at low pH values.

Application to Plant Control

These reactions are applicable to plant control of free residual chlorination. It is apparent that more chloramine is present in the early detention periods of the process than in the later detention periods. For process control, the residual may be determined at a

sampling point early in the treatment process and at another sampling point late in the process. Early in the treatment process the chlorine residual will include a greater percentage of combined available chlorine. Late in the treatment process the chlorine residual will include a greater percentage of free available chlorine. The magnitude of the early free available chlorine residual, which is required in order to provide a specified late free available chlorine residual, may readily be established by plant operation.

When a water after treatment by the break-point process has a final pH value of 8.0 to 9.0, no noticeable amount of nitrogen trichloride (NCl_3) will be formed. At lower final pH values, in waters having the same content of free ammonia, the amount of nitrogen trichloride produced will be increased. Appreciable amounts of nitrogen trichloride will impart noxious odors to the water. It is for this reason that, when the break-point process is employed, an adequate detention period should be available and the treated water should be exposed to the air to provide for release of gases. It is for this reason also, that water containing a free available chlorine residual should not be mixed with another water containing free ammonia.

If the application of chlorine will accomplish free residual chlorination without the use of the break-point process, it is obvious that the water did not contain significant amounts of free ammonia and that long contact and exposure to air are not required. If the break-point process is employed as plain-chlorination, the pH value of the treated water should be 8.0 or higher. If this process is employed as a post- or re-chlorination, the treatment should be controlled as it would be in the pre-chlorination practice.

Looking Ahead

The author has endeavored to present a supported concept of practice as it is viewed today by water chlorination specialists. While it is true that the applications of chlorine have been well explored and that we have a working understanding of the chemistry of the chlorination of nitrogenous compounds in dilute aqueous systems, there remains a great deal to be done in water chlorination.

The safety record for the past few years has not been impressive. The suppliers have a real goal in reestablishing their prewar excellence in this respect, The action of chlorine on viruses, which may be present in water, needs study. A good start has been made on this at Ann Arbor. The author has never been satisfied with the knowledge of the ultimate fate of chlorine added in large quantities to water containing gross pollution. Chang *(12)* has substantially filled this gap of information but there remain things not yet understood by the author. Many of the pollutants are readily chlorinated. It is a fact that most chlorinated organic compounds are toxic to man—some of them are chronic toxicants. Finally, as Jordan *(13)* observes, it is hoped that the enzyme researchers will continue their work in an effort to determine what, if any, is the effect on the human animal of the ingestion of free chlorine in his water intake.

The practice of the art of water purification seems to attract men who become devoted to their science. There is something about a water course and the quiet movement of masses of water through a purification plant which challenges man. A good scientist asks question continually and seeks to find logical answers. It is reasonable to expect progress to continue in this field. Certainly Green and Stumpf have set a pace with their explanation in 1946 of how chlorine kills bacteria.

The author believes that Calvert's humble remark in the late thirties is applicable to water chlorination considerations today. After completing long studies on superchlorination, and being baffled by the results, he wrote a friend of his work, concluding—"We have much to learn."

Acknowledgment

This paper has been prepared with the aid and advice of a friend and co-worker in water chlorination. The author acknowledges the considerable assistance of Harry A. Faber, Research Chemist of the Chlorine Institute.

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TAPPI Notes

Clyde W. Steele, formerly of the U. S. Army, is now coating superintendent at the Combined Locks Paper Company, Combined Locks, Wis.

Anders R. Kjellgren, formerly of the Institute of Paper Chemistry, is now chemical engineer for the American Defibrator Company, Chrysler Bldg., New York, N. Y.

J. B. Michon, managing director, Cie, Nord Africanine de Cellulose, has been transferred from Paris to II bis, rue Lys du Pac, Algeria.

The British Paper and Board Industry Research Association is now located at St. Winfred's Laboratories, Welcomes Road, Kenley, Surrey, England. Norman R. Hood is director.

James d'A. Clark, consulting engineer, Longview, Wash., was appointed by the Executive Committee of the Technical Association of the Pulp and Paper Industry to membership on the Committee. Dr. Clark succeeds E. F. Burns, chief engineer of the International Paper Company, who found it necessary to resign during the recent annual meeting. Dr. Clark is general chairman of the TAPPI Testing Division.

Carl J. Bergendahl, formerly of Inlands A/B., is now with the Ferguson Paper Mills, Inc., Pomona, Cal.

George H. Gallaway is now acting resident manager of the Lebanon, Ore. mill of the Crown Zellerbach Corporation.

Himmatsinha Navlaka, manager of the Pressed Board and Plywood Factory, Dalmiangar, Biker, India is now temporarily located at the Forest Products Laboratory, Madison, Wis.

Oscar Rolls, chief enginer for Follum Fabrikker A/B., Hoenefoss, Norway, is visiting in the United States.

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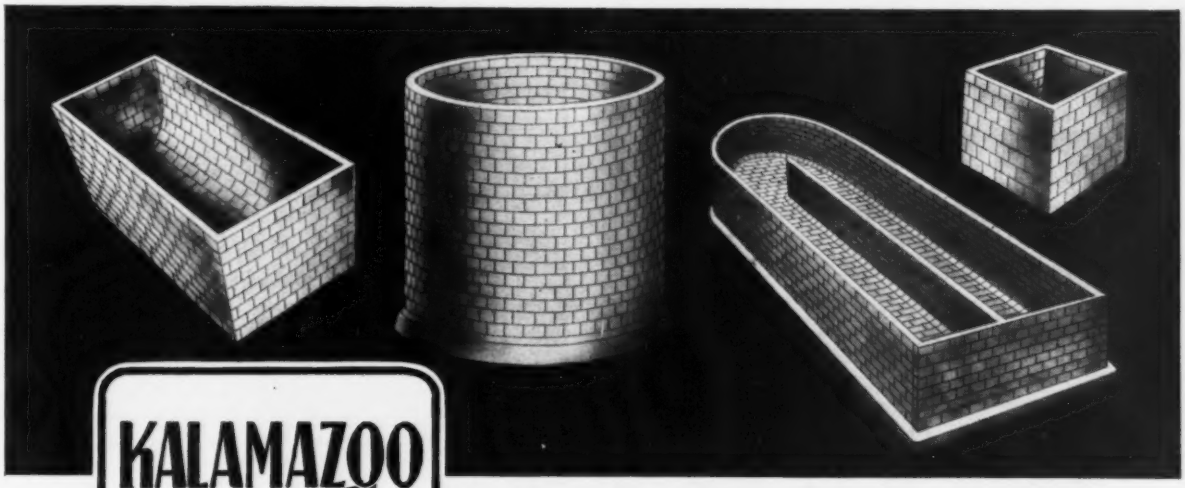

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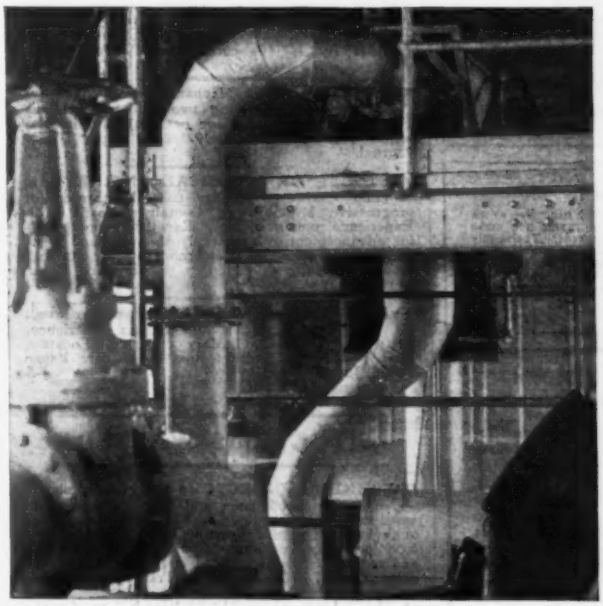

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- Man to work in laboratory and demonstrate starch adhesives
- Cylinder tour boss
- Chemical salesmen and demonstrators
- Mechanical and plant engineers, master mechanics, etc., salary $6,000-$10,000
- Cameron rewinder operator for New England
- Millwright (N. E.)
- And many others

We invite correspondence (strictly confidential) with paper and pulp mill executives seeking new positions and with employers seeking new personnel. J-5

PLANT MANAGER

An unusual opening is available for plant manager in a one-machine mill located in Pennsylvania, manufacturing folding boxboard exclusively. Compensation will be in five figures, plus profit-sharing bonus.

We are only interested in communicating with men having thorough experience in this field.

In your reply, give full details of experience, personal qualifications, etc. Address Box 47-436 care Paper Trade Journal. J-19

WANTED

First Class Millwright to work in Board Mill and Folding Paper Box Plant. Housing Facilities available. Apply at once. Robertson Paper Box Company—Montville, Conn. Telephone Norwich 1824. J-12

WANTED MECHANICAL ENGINEER

Skilled and experienced in industrial power plant design and steam and power studies. Good position for right man. Give training, experience, and salary expected. Location Michigan. Reply to Box 47-238 care Paper Trade Journal. TF

SALARIED POSITIONS

$2,500-$25,000. This thoroughly organized confidential service of 57 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.

SALES MANAGER

With Mill Following
For Paper Stock
With
Leading Waste Paper Packer
Good Salary
Attractive Proposition
Box No. 47-268 care Paper Trade Journal TF

SUPERINTENDENT

for paper converting plant located near New York City. Must be able to maintain, repair and make improvements in present equipment. Thoroughly experienced as a machinist and/or mechanic. Give complete details with your answer. Starting salary $75 but will pay up to $150 for a man who can fill our requirements. Box 47-409 care Paper Trade Journal. J-5

SALES PROMOTION ENGINEER

Leading manufacturer of industrial instruments has unusual opportunity for graduate engineer experienced in the pulp and paper or textile industries; or one with knowledge of process control instrumentation who is interested in applying this knowledge to these industries. Work consists of process control engineering, writing of quotations, order follow-up, and sales correspondence with branch offices and customers. Some travelling involved. Reply giving complete details of experience, education and personal history to Box 47-388 care Paper Trade Journal. TF

WANTED—Man to take charge of Finishing Department in mill making 25 tons per day. Require man who has had experience in the operation of cutters and trimmers. Address Box 47-393 care Paper Trade Journal. J-12

HELP WANTED

WANTED—Experienced Machine Tender for cylinder machine making the better grades of Folding Boxboard. Excellent hourly rate. Address Box 47-380 care Paper Trade Journal. J-5

WANTED—Machine Tenders and Back Tenders for small machine in New England making high grade papers. Address Box 47-394 care Paper Trade Journal. J-12

WANTED—Tour Bosses for new Fourdrinier paper machine making light weight kraft specialties. Give personal data in first letter. Address Box 47-405 care Paper Trade Journal. J-12

SALES EXECUTIVE AND CONTACT MAN—An aggressive man for direction of field representation of a nationally known Milwaukee paper product concern. Paper experience preferred. Must have ability to handle men. Address Box 47-426 care Paper Trade Journal. J-5

CHEMIST OR TECHNICIAN for pulp laboratory control and development work. Small amount travel required and some experience necessary. Give full particulars of experience, salary expected, when available and personal details in first letter. Metropolitan area. Address Box 47-423 care Paper Trade Journal. J-19

WANTED—Good steady Beater Engineer for 3 machine mill making white and colored light weight tissues. Address Box 47-419 care Paper Trade Journal. J-12

DRAFTSMAN WANTED—Desire man with pulp and paper mill experience to work in mill in middle west. Permanent position and reasonable salary for right man. Address Box 47-422 care Paper Trade Journal. J-5

WANTED—Machine Tenders for new Fourdrinier paper machine making light weight kraft specialties. Give personal data in first letter. Address Box 47-406 care Paper Trade Journal. J-12

WANTED—Master Mechanic or Machinist for paper mill operating two cylinder and one Fourdrinier machines. Give personal data in first letter. Address Box 47-407 care Paper Trade Journal. J-12

CHEMIST OR CHEMICAL ENGINEER to take charge of quality control program for progressive Mid-Western Container Board Mill. Experience not necessary. Excellent opportunity for advancement. Please reply in own hand writing, include recent snapshot and indicate starting salary desired. Address Box 47-408 care Paper Trade Journal. J-12

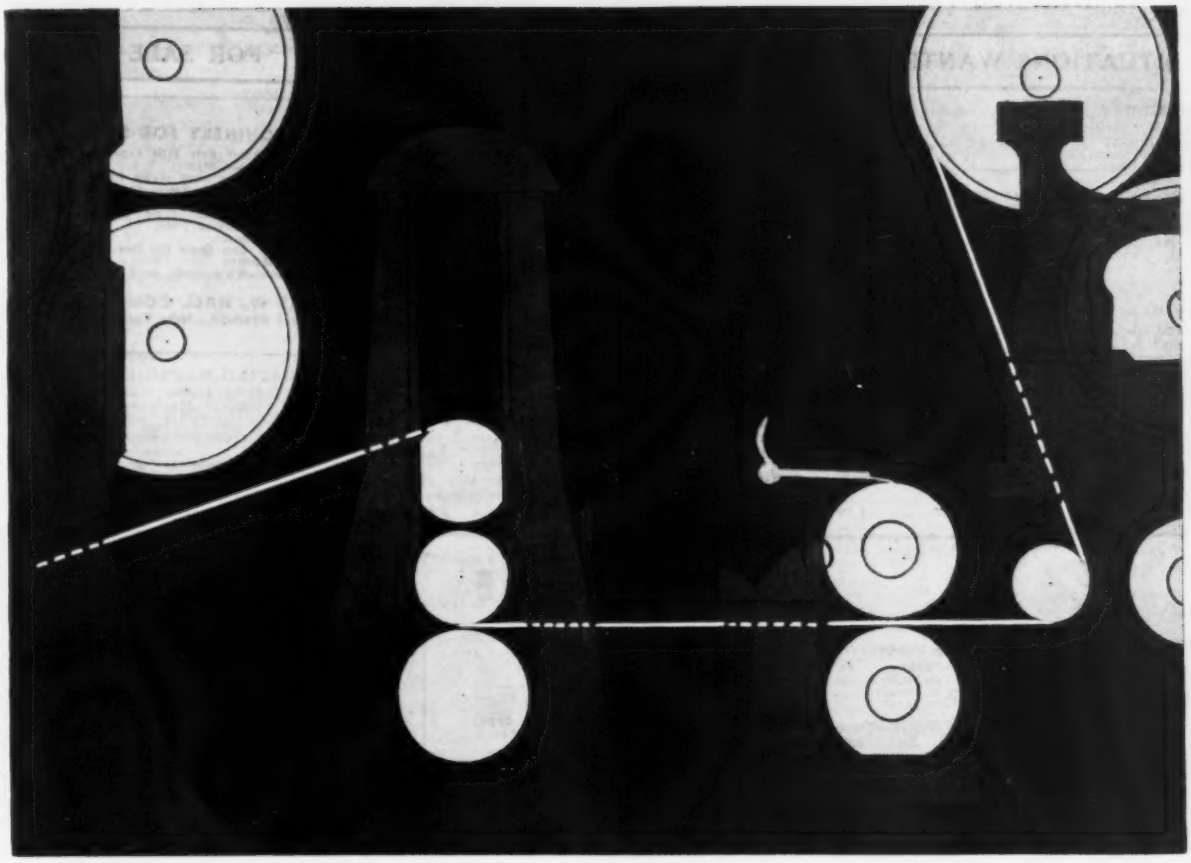
DRAFTSMAN—Mechanical Engineer preferred. Pulp and Paper machine design experience. State experience and salary expected. Location New York City. Address Box 47-437 care Paper Trade Journal. J-5

SITUATIONS WANTED

TECHNICAL DIRECTOR—34, graduate chemist experienced paper and board mill, groundwood mill, food container boards, specialties. Thorough knowledge of converting operations of paper food packages, waxing, laminating, development and research. Now employed. Desires change. Address Box 47-376 care Paper Trade Journal. J-5

ASSISTANT SUPERINTENDENT or Assistant Manager. Young pulp and paper engineer technical training, experienced in research and production, desires connection with a progressive concern. Address Box 47-387 care Paper Trade Journal. J-5

WANTED—Position as Chief Power Engineer with a company that wants a man that can get results and cut expenses. 18 years experience. Age 40 and married. Address Box 47-403 care Paper Trade Journal. J-5



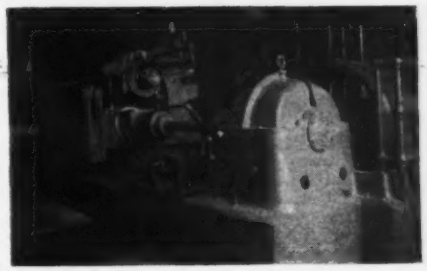
Size Presses for Board

The diagram above may give you food for thought—a breaker stack with a trio of chilled iron rolls just ahead of the last several dryers—then a size press in which to starch for sizing.

By splitting the dryer section and locating the size press ahead of the last several dryers, a smoother board with a better printing surface is obtained; also better laying of the fuzz when using free stock; also less calendering, hence more bulk.

Such installations require no extension of the machine room—only the remounting of the required number of dryers in vertical stacks, a change board mills still operating horizontal dryers should make to improve drying conditions.

Given the necessary data, a definite proposition will be submitted to you.



Black-Clawson size press installation equipped with Black-Clawson spiral bevel gear drive.

The Black-Clawson Co.

Hamilton, Ohio

SHARTLE BROS. MACHINE CO., Middletown, Ohio DILTS MACHINE WORKS, Fulton, N. Y. Assoc.: ALEXANDER FLECK LIMITED, Ottawa, Canada

SITUATIONS WANTED

CHEMIST with ten years experience in all types of writing papers. Prefer South or West. Address Box 47-398 care Paper Trade Journal. J-5

PULP AND PAPER MILL ENGINEER for equipment layout, design, maintenance and operation, open for temporary or permanent engagement. Address Box 47-389 care Paper Trade Journal. J-19

MR. PAPER BAG MANUFACTURER—Can you use a man who desires management for a career? ASSETS:—Loyal, honest, judicious, 20 years experience as a top notch adjuster. Address Box 47-397 care Paper Trade Journal. J-5

SUPERINTENDENT — Desires position with progressive firm offering future opportunities. Can improve quality, lower cost and increase production. Age 39. Salary no object. Excellent reference. Address Box 47-420 care Paper Trade Journal. J-19

SITUATIONS WANTED

SUPERINTENDENT—With a utility training covering entire field, including Mechanical Engineering. Capable of laying out a revamping program to modernize or upgrade a Boxboard or Specialty Cylinder Mill. Address Box 47-435 care Paper Trade Journal. J-19

TECHNICAL DIRECTOR—LAST EIGHT YEARS IN ADMINISTRATION OF RESEARCH AND CONTROL PROGRAM FOR NATIONALLY KNOWN ORGANIZATION. KNOWLEDGE OF STATISTICAL QUALITY CONTROL. LOCATION IMMATERIAL. Address Box 47-433 care Paper Trade Journal. J-12

FOR SALE

FOR SALE—1 Noble & Wood Jordan, Belt driven. Address Box 47-418 care Paper Trade Journal. J-12

FOR SALE—One 50" Hamblet Cutter with 10 roll back stand. Waste Products Company, P. O. Box 675, Niagara Falls, N. Y. J-12

FOR SALE

MACHINERY FOR SALE

110" Hamblet heavy duty Mill Type Sheeter.
54" Inman shear cut Slitter.
54" Brown & Carver hand clamp Power Cutter.
44" National Automatic Power Cutter, rebuilt.
78" Meisel two color rotary.
25 x 38 Babcock Cylinder Press, 3-roller.
20 x 28 six-rod Standing Press.
14 x 22 John Thomson.
American heavy duty Cross Cut Saw.
Bunn Tying Machine.
Baling Presses—NEW—both hand and power.

THOMAS W. HALL COMPANY, Inc.
120 West 42nd St., New York 18, N. Y.
TF

PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed. New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, 11, N. Y. TF

FOR SALE—72" Sheeter with layboy and backstand. Now available. Address Box 47-416 care Paper Trade Journal. J-5

FOR SALE

BEATERS
1—2000 lb. Holyoke-Iron Tub Beater.
3—1200 lb. E. D. Jones (no tubs).
1—1000 lb. Dayton Beater (no tub).
1—500 lb. Beater—iron tub.

BLOWERS
3—Buffalo Forge Company—Size 7—Duplex Conoidal steel plate Blowers. Ball bearing.

CALENDER STACKS
1—5 roll—72" face.
1—7-roll 36" Holyoke Machine (supercalender).

CENTRAP
1—Shartle Brothers Centrap.

CHIPPER
1—50" Murray Chipper (8 knives).

CREPING MACHINE
1—86" Waldron Creping Machine, practically new.

CYLINDER MOULDS
1—30" diameter x 74" face.
3—30" diameter x 54" face.
1—30" diameter x 75" face.
3—36" diameter x 84" face.
1—30" diameter x 80" face.
3—30" diameter x 72" face.

DOCTORS
14—Dillon Doctors — complete with accessories—98" face.

DRIVES
3—30 h.p. Downingtown, enclosed drives ratio 6 to 1—with clutch and cone pulley for paper machine.
1—Cleveland Worm Drive, Ratio 10 to 1
3—Smith & Winchester mortise gear. Drives.
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM.
1—#1 Reeves Drive.
1—#2 Reeves Drive.
1—#5 Reeves Drive.
4—Horton vari-speed Pulleys.
3—Foote—7½ h.p. Speed Reducer (Ratio 240 to 1).

DRIVES (Angle)
1—Philadelphia 50:1—1 h.p.—1200 r.p.m.
3—Philadelphia 21½:1—3 h.p.—1200 r.p.m.
1—Link Belt 25:1—r.p.m. input 1150—r.p.m output 46, including 7½ h.p. G.E. totally enclosed motor.

V-BELT DRIVE
1—31½" diameter x 7½" face, 5 groove.
1—16½" diameter x 7½" face, 5 groove. (With clutch).

DRYER SECTIONS
8—Dryers 36 x 64 with frames, bearings, gears, felt roll, base plates, etc.
5—Dryers 36 x 72, complete with frames.

DRYERS
8—48" diameter x 118" face.
1—28" diameter x 76" face.
1—48" diameter x 94" face.
2—25" x 120" (Baby Dryers).
1—48" x 100".
3—24 x 72 (Copper face, textile type).
3—24" diameter x 50" face.

ERKENSATORS
1—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

FLAT SCREENS
2—12 plate Flat Screens.
1—4 plate Flat Screen.
1—6 plate Flat Screen.

HYDRAFINER
1—Dilts Hydrafiner (1200 r.p.m.)

JORDANS
1—Noble & Wood, Pony Monarch, Belt Driven.
1—#2 Miami.
1—No. 9 Emerson Jordan—for direct connection to a motor.
1—Noble & Wood Monarch.

KNIFE GRINDER
1—96" Rogers Knife Grinder.

LAMINATING MACHINE
1—50" Laminating Machine—with 3 dryers.

PULLEYS
Various cone and assorted pulleys.

PULP EQUIPMENT
1—32" three pocket Glens Falls Grinder (for 27" wood).

PULP SCREEN
1—IMPCO centrifugal pulp screen design No. 3.

PULPER
1—Jones Pulper.

PULVERIZER
1—Erie coal pulverizer.

PUMPS
1—Buffalo Pump—5500 g.p.m. (50' head).
4—Vertical Schutte & Koerting Acid Pumps (with motors).
3—Goulds—2 stage—420 g.p.m.—1010' head.
1—Gardner Denver 4 x 6—including 15 h.p. totally enclosed motors—700 g.p.m.—72' head (new equipment).
2—Well Pump Co.—100 g.p.m.—100 P.S.I. including 15 h.p. motors (new equipment).
1—Bell & Gossett—600 g.p.m.—100' head—including 25 h.p. motor.
1—Bell & Gossett—300 g.p.m.—120' head—including 15 h.p. motor.
1—Goulds Sump Pump—50 g.p.m.—20' head —including motor.

Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

REELS
1—72" Downingtown Expansion Reel.
1—2 Bowl Reel—110" face.

ROLLS
500—Brass tube-steel tube—rubber covered iron rolls—various sizes

SCREEN PLATES
20 Plates cut .016.
10 Plates cut .008.
Also other sizes and cuts in stock.

SHEETERS
1—50" Hamblet Sheeter.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SHREDDERS
1—Gilman Shredder.
1—Waterville Shredder

SLITTERS AND WINDERS
1—Cameron—Type 10—72" face.
1—Cameron—type 10-10—72" face. (Shear cut type.)
1—114" Kidder.
1—30" Langston
1 36" Beck Razor Blade type Slitter & Winder.

STACKERS
1—Economy Engineering 2000# capacity—with motor.
1—Economy Engineering 1000# capacity—hand operated

STOCK PUMPS
1—10 x 12 open impeller. (All lead).
1—8 x 10 Moore & White Triplex.
Numerous other Centrifugal Stock Pumps. Advise as to your requirements.

SUCTION COUCH ROLL
1—18" diameter x 100" drilled face.

SUCTION FELT ROLL
1—Nash 110" Suction Felt Roll.

TOILET EMBOSSER
1—84" Embossing Toilet Roll Winder.

VACUUM PUMPS
1—No. 1 Nash Hytor Vacuum Pump.
1—No. 7 Sturtevant Vacuum Pump.
1—14 x 20 Connersville.
1—18 x 28 Sandusky.
1—Sandusky 8 x 10.

WET MACHINES
1—74" Moore & White

YANKEE DRYERS
1—8' diameter x 120" face.
1—8' x 175" face.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?
Wanted Cylinder and Fourdrinier Machines (complete mills).

Paddy Ross, Pres. **J. J. ROSS COMPANY** Ben Kurs, Treas.

250 Frelinghuysen Ave. **Tel.—Bigelow 3-3720** **Newark 5, N. J.**

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CABLE ADDRESS: JACKROSS

ROSS PAPER MACHINERY CORP.

265 PASSAIC STREET
NEWARK 4, N. J.

CONVERTING
PAPER MAKING EQUIPMENT

NEW, USED, REBUILT
PAPER AND PULP MACHINERY

1—Beloit 22" diameter Suction Couch Roll for 119" wire width with 115" suction opening.

1—Beloit 22" diameter Suction Couch Roll for 111" wire width with 107" suction opening.

BEATERS
1—6000# roll 36" face x 36" dia.
2—750 lb. Horne Iron Tub, Roll 68"x40"
4—1200 lb. A. D. Jones Beater—no tubs
1—1200 lb. Noble and Wood—no tub. Bears new fittings for roll.
3—Valley Iron—Roll 67" diameter x 50" face—wood tub.
4—E. D. Jones 2000# iron tub—with Warren hydraulic lighter hoists. Roll 67" dia. x 60" face.
1—Brooker Beater—Iron Tub—35 ton capacity.

BEATER ROLLS
3—44" face x 52" diameter.
1—48" face x 48" diameter.

BIRD SCREEN PLATES
17 Plate—68 out. New condition

BLEACHERS
2—Fletcher high density bleachers—used 8 months.

BLOWERS
3—Wilbraham-Green Rotary Positive Blowers and Gas Exhaustor.
1—Sturtevant #8.
Large Stock—Purchased from W.A.A.

BRASS ROLLS
15—240" face x 9¼" diameter—12½" journals.

CALENDERS
1—58" Textile Machy. Co. 3 roll Finishing Calender.

CALENDER DOCTORS
1 set of 16 Warren Doctors 104" face with frames.
60 Warren Doctors—various sizes

CALENDER ROLLS
38 rolls various sizes

CALENDER STACKS
1—2 roll Holyoke 36" face.
1—Pusey & Jones 9 roll 54" face.
1—7 roll—72".

COMPRESSOR
1—Nash—Gas or Air Compressor—Type MD 672. Capacity 40 CFM at 100#. Direct connected to 5 h.p.—1750 r.p.m.—440 volt motor.

CONTINUOUS TRAVEL CUT-OFF
1—Langston 74" r.h. Type S. Continuous Travel Cutoff, with change gear box.

CONVERTING EQUIPMENT
2—Sanitary Napkin Machines. With motors and starters.
1—Stiles Double Head Stitcher.
2—Cameron Type 72" Towel Converting Machines.
1—45" Hudson Sharp Facial Tissue converter—with embossing attachment.

COUCH ROLLS
1—19¾" diameter x 92" face—brass covered.
2—20" diameter x 62" face—brass covered.

CYLINDER MOLDS
2—110" face x 39" dia.
1—72" face x 39" diameter.
1—78" face x 39" diameter.

DANDY ROLLS
1—122" face 18" dia.
1—138" face 12" dia.
1—129" face 9¼" dia

DRYER DOCTORS
40—Warren Doctors. Various sizes.

DRYERS
2—24" Dia. x 48" Face.
1—24" diameter x 72" face.
5—74" face x 28" diameter with gears and bearings.
6—74" face x 48" diameter—with gears and bearings.
18—New 120" face x 48" diameter dryers.

FELT ROLLS
75—160" face x 7" diameter. Steel felt carrying rolls.

FLAT SCREENS
1—Harmon 10 plate.
1—Montague 6 plate. Ball bearing.
1—12 plate Bagley & Sewall Flat Screens with scrapers and spare set of plates.
6—8 plate Sandy Hill Flat Screens

FORK TRUCK
1—MobileLift—Gasoline—Lift 72".

FOURDRINIER SHAKES
1—Beloit Fourdrinier Shakes.

FOURDRINIER WET END
1—150" Pusey & Jones.

HAMMERMILLS
1—American Hammermill—37" anti friction bearing equipped
1—Williams 18" Hammermill Ball Bearing.

HOG
1—Mitts & Merrill Hog. 12" x 12".
1—Fitchburg 7 x 9. Ball bearing.
1—Mitts & Merrill.

JORDANS
2—#2 Black-Clawson. For motor drive.
1—E. D. Jones Imperial—direct connected to 550 volt motor—with starter.
1—Dillon—25 ton capacity.
2—Miami #46 for motor drive, ⅝" filling.
1—Dillon #2—50 ton capacity.
2—E. D. Jones Standard Ball Bearing direct connected—75 H.P. 440/360 motor.

KNIFE GRINDER
1—84" Covitt & Hanchett with 7½ HP motor. Purchased new—1945.

KNOTTERS
1—Wells Knotter.
2—Trimbey Knotters.

MOTORS
1—G.E. 200 h.p.—550 volts—3 phase—60 cycle.
1—Westinghouse 40 h.p. 900 r.p.m.—3 phase—60 cycle—440 volts—with starter.
1—G.E. 5 h.p. 1800 r.p.m.—3 phase—60 cycle—220 volts—with starter.
1—G.E. 75 h.p. 575 r.p.m.—3 phase—60 cycle—440 volts—with starter.
1—G.E. 100 h.p. 575 r.p.m.—3 phase—60 cycle—440 volts—with starter.
1—G.E. 50 h.p. 490 r.p.m.—3 phase—60 cycle—440 volts—with starter.
1—200 h.p. 235 r.p.m.—440 volts—3 phase—60 cycle.
1—800 Ampere Westinghouse Generator. New.
2—G.E. Slip Ring—125 h.p.—880 r.p.m.—440 volts.

PLATER
1—Holyoke 2 Roll 18" dia. 38" face.

PULLEYS
40—Cone Split and Solid Cast Iron Pulleys. Various Sizes.

PULP EQUIPMENT
1—120" face Kamyr Press.
1—72" Sumner Disc Barker with motor.
2—IMPCO Pulp Screens
2—Trimbey Knotters
2—Agmor Pulp Screens
2—Trimbey Screens
1—Jigger—1 deck—vibrating screen.
1—Zaremba Triple Effect Evaporator — 84" diameter.

PULPERS
1—Voith Pulper 20 tons cap.
1—Bird Pulper.

PUMPS
3—Worthington Pumps 10,000 g.p.m.—35' head. Requires 75 h.p. at 550 r.p.m
6—Warren Vertical Pumps. 6" by 3", 135 g.p.m. 80' head. Direct Connected 6 h.p. motor 440 volts.
3—Worthington 8", 2 stage, 200 g.p.m. 224' head. Bronze Ball Bearings.
1—American Marsh 200 g.p.m.—80' head—3" suction 2½" discharge.
3—De Laval Verticals—540 g.p.m. 1740 r.p.m. —30' head 3" x 3". Direct connected to 7½ h.p. 440 volts.
1—6" Pusey & Jones Open Impeller Centrifugal Stock Pump—belt driven.
3—3" Lance Size Pumps—belt driven.
1—La Courtney 4 stage, 1000 g.p.m., 1750 r.p.m., 750' head. With base and couplings for motor.
2—Worthington Monoblock—250 g.p.m.—130' head—direct connected to 15 h.p.—3500 r.p.m.—220/440 volts, totally enclosed, ball bearing motor.

JACK ROSS, Pres.

Sustaining Member

1—La Courtney 6 stage 1200 g.p.m., 1760 r.p.m., 1100' head, with base and couplings for motor
1—Terry Marsh 750 g.p.m., 250' head. Requires 125 h.p. motor.
2—Ingersoll Rand all bronze 175 g.p.m.—40' head.
1—Worthington 3"—200 g.p.m.—3550 r.p.m.—480' head.
1—Frederick Open Impeller Pump—1800 g.p.m. —100' head with extended base for connection to motor.

REFINERS
1—Weiner Refiner 24" with extended base for direct connection to motor, and a large lot of new spare parts.

ROTARY SCREENS
1—#1 Bird with steel vats, lead lined.
3—Moore & White
5—Bird Rotary Screens. Cylinder 36" dia. x 90" face. Copper vats.

RUBBER PRESS ROLLS
1—120" Face—10" Diameter
1—110" face x 10½" diameter.
1—100" face x 18" diameter.

REELS
1—102"—3 bowl reel
1—192" Pusey & Jones Single Drum Reel.

SHEETERS
1—136" Hamblet Duplex.
1—104" Hamblet
1—63" Hamblet Duplex Rotary Cutter—12 roll backstand with M & W layboy.
1—50" Hamblet with 6 roll back stand and motor.

SHREDDERS
2—24" Sprout Waldron heavy duty shredders—anti friction bearing equipped.
1—Taylor Stiles Portable Pulp Shredder—on wheels.
1—Rythor and Pringle Shredder.
1—36" Mitts & Merrill with 125 h.p. motors and starters.

SLICES
2—E. D. Jones Flexible Slices.

SLITTERS AND WINDERS
1—40" Waldron—2 drum.
1—42" Cameron Slitter with 30 knives and motor.
1—120" Moore & White 4 drum slitter and rewinder—rebuilt.
1—196" Pusey & Jones Slitter and Rewinder with Unwind Stand.

STONITE PRESS ROLL
1—Stowe Woodward 111" face x 22" diameter

STUFF PUMPS
1—Dillon 7½ x 12" duplex
1—Moore & White Duplex 8x12".
1—Shartle 8" single plunger.
1—3" x 3" Worthington Triplex.
1—Beloit Duplex—8 x 18".

SUCTION FELT PIPE
1—Scofield Suction Felt Pipe.

SUPERCALENDER STACKS
1—7 roll Norwood—52" face. Complete with drive.
1—72" 9 roll Norwood—complete with drive.

TRIMMERS
1—38" Undercut Trimmer.
1—48" Undercut Trimmer.
1—88" Undercut Trimmer.
1—44" Seybold Holyoke Trimmer.

TURBINES
1—Westinghouse 125 h.p. 125 steam pressure—15 back pressure. Complete. Used 1 year.

VACUUM PUMPS
2—14" x 20" Connerswills
1—Nash Hytor Size MD 671. Direct connected to 1½ h.p. 220/440 motor.

VOITH INLET
1—112" Voith High pressure stock inlet, equipped with distributor breaker roll.
1—141" Voith Inlet with distributor roll.

FOR SALE

SOS Bag Machines making 1, 2, 3, 7, 8 & 10 lb. bags.
1—52"; 1—60"; 1—64" Waldron Brush Coaters. Festoon equipment. New J. O. Ross Drying Oven. 5 Buffalo Blowers. New winding reel. Motor equipments.
1—Sheridan Die Press 27x44"—rebuilt.
1—14 x 16" Horizontal Twin Variable Speed Engine.
Power Paper Cutter: 1—44" 20th Century Seybold; 1—34" late Oswego. 1—45" Sheridan late model. 1—54" Seybold Holyoke Mill Type.
6—Potdevin and 1 Lockport flat and square bag machines, complete with motor equipments, making bags from ¼ to 35 lbs.
1—64" complete creping machine.
2—#2 Lanoye Pulpers.
1—55" wide Hamblet Vickery Layboy.
1—36" Beck Shear Cut Slitter and Rewinder.
1—48" Inman board slitter, complete with motor.
1—90" Finlay Rotary Sheeter with Moore & White Layboy and 8 roll backstand.
1—92" Dillon Duplex Sheet Cutter with Brannon Ream Folder and 24 roll doubledeck backstands.
1—60" and 1—50" seven roll Holyoke Calender Stacks.
1—60" Hammersley Score Cut Slitter & Rewinder.
1—51" Hamblet Rotary Sheeter with slitting attachment, Moore & White layboy and 8 roll backstand.
2—1000 lb. capacity Jones High Speed Beaters, complete with Alexander tentacular drives and 100 HP, AC motor equipment.
4—Rotary Embossing Machines, 33" wide.
1—Laminating machine 96" wide. Will laminate sheets any length up to 150" by 1" variations. Suitable for laminating paper or board.
1—7"x8" Gould three plunger stock pump, with bronze fittings.
1—42" Camachine Model 26—2 Slitter and rewinder.
1—26" Waldron 8 Color Wall Paper Printing Press, with Jolly static eliminator, 50 ft. turn around dryer, blower and AC motor equipment.
1—74" Black-Clawson Duplex Rotary Sheet Cutter.
1—Morrow Wrapping and Sealing Machine. Complete with motor and controls. Capacity 450 packages per hour.
1—40" Jacques Shear.
1—52" Cameron, type 40-1AF. Slitter and Rewinder.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y.
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FOR SALE

1—Chandler Taylor 2 cylinder engine 11" x 11" steam 150 lb. r.p.m. 250.
1—Chandler Taylor 2 cylinder engine 12" x 12" steam 250 lb. r.p.m. 230.
1—Harrisburg Uniflow Engine, cylinder 20" dia. 20" stroke 120 lb. steam 240 h.p.
Address Box 47-313 care Paper Trade Journal. TF

FOR SALE

One 25 cycle General Electric alternating current generator, No. 65412—Type ATB-24-500-300 Form C., 126 PF amperes, 1.0 speed 300 500 KW 2300 V, G. E. Syn. Motor 65411, Type ATB 10-70-M300, Amp. field 75, speed 300, Ampere 850, V 480, HP. 850, 700 KVA continuous.

This equipment has been used as a frequency charger in our plant and is in excellent operating condition and can be inspected any time. Address Box 47-413 care Paper Trade Journal. J-5

FOR SALE

HOLYOKE CALENDER STACK

55" wide, 9 rolls, water-cooled bearings Web Frame, 17" guides for quick roll removal, compound levers and weights, 75 KW MG set with variable drive. Machine can be inspected in operation.

Please apply Box 47-434 care Paper Trade Journal
J-5

FOR SALE

1 Noble and Wood Mammoth Jr. Jordan, arranged for belt drive, capacity 1 ton per hr.
1 Noble and Wood Mammoth Jr. Jordan, arranged for direct connection to meter, less motor, capacity 1 ton per hr.
1 Westinghouse geared speed changer, ratio 3 to 1, 175 H.P. Type SVR-13
1 Westinghouse geared speed changer, ratio 1 to 1, 175 H.P. Type SVR-13
2 Riley 5 retort stokers with steam engine drive
1 4000# capacity motor driven freight elevator with automatic stop control—can be inspected in operation at our plant.
1 120 inch slitter & scorer (fully equipped) Knowlton 60 x 120
1 Hamlet sheet cutter 82 inch knife
1 Oswego Paper Cutter 63 inch knife (A-1 condition)
1 Hobbs double scoring machine
1 Hobbs Fly machine
1 Hobbs Ender
1 Hobbs double corner cutter
1 Hobbs hand topping machine
1 Potdevin hand label glueing machine
1 Knowlton #7 single corner stayer
1 Model F-23-T Elwell Parker Lift Truck, fork type complete. Extra battery charger, and extra battery 15 cell 21 plate, type TLM Exide (New) 4000# capacity
1 6 plate packer Screen (Sandy Hill)
1 Camachine #6 model 1A
1 Carrick combustion controls for two boilers to be sold as unit.
1 82" Moore & White Rotary Cutter Duplex
1 #4 Reeves Drive open
1 #5 Reeves Drive open
1 Shepard Elevator, motor driven 1 H.P. 1 ton capacity
1 Shepard Elevator, hand operated 1800 lbs. capacity
1 Ton Elevator motor driven ½ H.P.
1 Deming 3½x4 triplex plunger pump
1 Lawrence 6 inch double suction water pump
2 8x12 inch Moore & White Duplex pumps
3 Downingtown Fan Pumps 6"
1 Ingersoll Rand Stock Pump (New) 10x6
1 Ingersoll Rand Stock Pump New) 12x6
1 Brass covered finishing press roll 17¾ inch dia. x 89½" face complete with bearings and Noble and Wood friction drive
10 100" phosphor bronze No. 2-A Bird Screens .022" slots never used after being reset once
12 6½ dia. x 92" face steel dryer felt rolls, 1 7/16" journals
1 750 GPM underwriter's fire pump, steam driven (complete)
1 Wagner Motor, 1 phase, typer 14TBA, 5 H.P., 60 cycle, 1750 R.P.M. Numerous large dia. steel and cast iron pulleys
Numerous elbows and tees for 5, 6, 8, 10, 12" spiral rivetted pipe

A visit to the mill would prove profitable as we have many items for sale too numerous to mention. See J. R. Stephenson, Plant Engineer at our plant in Walloomsac, New York.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, N. Y.

FOR SALE—1 Westinghouse, 150 HP, AC Induction Motor—435 RPM, Type CS, 440 volt, 3 phase, 60 cycle, Sleeve Bearing 4⅞" Shaft. Complete with base. In good condition. Address Box 47-438 care Paper Trade Journal. J-12

FOR SALE—One 38" Langston Sheer Cut Slitter and Rewinder including 12 sets of knives. Address Box 47-382 care Paper Trade Journal. J-5

FOR SALE

Paper machine 40 inch trim 17 to 20 ton per 24 hour period suitable for board or felt. Balance of equipment for complete mill also available. Box No. 47-424 Paper Trade Journal. J-5

FOR SALE
2 COLOR ROTO

38" wide by 25" circumference. Sheet Fed Rotogravure Press. Two separate colors but not surprinted. Press run very little. Without automatic feeder or electrical equipment. Will convert into roll feed if desired.

PRECISE ENGINEERING COMPANY
400 W. Madison Chicago
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FOR SALE

CONTINUOUS FACIAL TISSUE FOLDER AND CUTTER

Capacity a car eight hours. Delivery June 1947. Address Box 47-432 care Paper Trade Journal. J-12

FOR SALE

New Electric Hoists. Shaw-Box Electric Hoists 1000, 4000 and 6000 lbs. capacity. Budgit Electric Hoists 250, 500, 2000, and 4000 lbs. capacity. Budgit Chain Blocks ½ and 2 ton. All in stock. Immediate delivery.

RANKIN MACHINERY CO. INC.
1741 Columbus Ave., Sandusky, Ohio
Phone 481 J-5

FOR SALE

One 68" Laminating Machine for all types of laminating i.e. Kraft on liner, cellophane on Kraft or strawboard. Consists of laminating unit, four dryers 30"x68", Cameron Slitter and Rewinder, Line drives and DC motor equipment with transformer. A complete unit in A-1 operating condition.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., N. Y. 16, N. Y.
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300 KW West. 250 v.—432 HP West. Syn. 8 P.F.
300 KW G.E. Rotary 2 ped. brg. 6 ring.
150 KW Ridg. 250 v.—225 HP Ridg. Syn. 2200
100 KW West. 125 v.—150 HP West. Syn. 2200
50 KW 125 v. G.E.—75 HP G.E. 2200 v.
50 KW G.E. 125 v.—75 HP West. 220/440 v.
15 KW Wotten 125 v.—25 HP Wotten 220
10 KW Bardco 125 v.—15 HP Master 220/440
5 KW West. 125 v.—7½ HP F.M. 220/440

A.C. & D.C. GENERATORS

1250 KVA West. A.C. 440/3/60 1200 RPM.
175 KW Cr. Wh. 250 v. 700 RPM
400 amp. Hobart Welding Gen.
25 HP 220/440/3/60 Motor
45 KW West. SK 125 v. 700 RPM.
1000 amp. 60 volt Westgh. SK Welding Gen.

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1300 cu. ft. 100# pres. Worthington 2 stage, 20 & 12x16 Belted with Intercooler.
270 cfm 100# Chg. Pne. Gas. Portable.
220 cfm 100# Ing. Rd. Gas. Portable.
175 cu. ft. 100# pres. Chic. Pneu. 9x8.
1—164 cu. ft. Ch. Pneu. Steam Type.
3—373 cu. ft. Bury 12x10—A.C. Motors.
1—90 cu. ft. 100# Chic. Pneu.—A.C. Motor.

REDUCTION UNITS

500/700 HP Morse Chain Drive—4.28 to 1.
250 HP Ottumwa Unit 12½ to 1.
150 HP Nuttall 1.6 to 1.
150 HP G.E. Unit ratio 3 to 1.

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50 KW West.—Turbo 125 v.
250 KW Cr. Wh. Skinner Una. 250 v.
500 KW 250 v. G.E.—Terry mixed pres.
2—1250 KW .8 P.F. 2400/3/60 G.E. Curtis.
2500 KVA GE 2300/3/60 RPM.

AC MOTORS (3 ph. 60 cy.)

HP	Make	Wdg	Spd.	Type
1440	West.	Syn.	1200	NEW
1000	West.	Syn.	1200	NEW
750	West.	Syn.	1200	NEW
450	G.E.	Sl. rg.	257	I-M
400	G.E.	S.R.	514	I-M
350	G.E.	Sl. rg.	900	I-M
300	West.	Sl. rg.	1750	CW
250	West.	S.R.	277	CW 1314
225	West.	S.R.	585	MW
200	G.E.	Sl. rg.	240	MT 412
200	Cr. Wh.	S.R.	505	
200	West.	S.R.	350	CW
100	West.	Sl. rg.	1800	CI
75	G.E.	S.C.	875	I-K
50	Cr. Wh.	S.C.	505	
50	G.E.	Sl. rg.	900	I-M
50	West.	S.R.	585	CW658D
40	G.E.	Sl. rg.	900	MTC
35	West.	S.C.	870	CS

D.C. MOTORS

HP	Make	Voltage	Wdg.	Speed
200	Cr. Wh.	230	sh.	500
175	G.E. MDS109¾	230	ser.	475
100	G.E. MD108	230	ser.	480
50	G.E.	230	sh.	250/1000
50	West.	500	cp.	565
50	West.	230	sh.	250/1000
50	Northern	230	ser.	600

D. C. MOTORS

HP	Make	Voltage	Wdg.	Speed
50	Rel. 185T	230	sh.	1500
40	G.E. (Vert.)	230	cp.	1750
40	Reliance	230	cp.	700
40	Roth 126RS	230	cp.	1700
31	G.E. C02002E	500	ser.	710
35	Cr. Wh.	230	sh.	700
35	Cr. Wh.	230	sh.	900
25	West.	230	sh.	850/2050
25	West. SK113	230	cp.	825
20	West. K6	...	ser.	550
15	West. K6	...	ser.	515
15	West. SK93	230	sh.	825
15	West. S5	230	cp.	1000
15(4)	Cr. Wh.	230	sh.	1400/1700
13	West. SK113	230	Enc. cp.	850
10	G.E.	230	cp.	1750
10	G.E.	230	sh.	1150
10	West.	220	sh.	730/1460
7½(2)	Al.-Ch.	230	sh.	350/1050

NEW DC MAGNETIC MOTOR STARTERS

6-25 HP 230 V. C-H Dripproof
5-40 HP 230 V. W. Leonard Dripproof
5-50 HP 230 V. C.H. Dripproof
5-60 HP 230 V. C.H. Dripproof
5-60 HP 230 V. W. Leonard Dripproof
5-60 HP 115 V. W. Leonard Dripproof
5-75 HP 230 V. C.H. Dripproof
2-100 HP 230 V. C.H. Dripproof

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Tarentum, Pennsylvania

FOR SALE—Wonderful buy of following equipment and materials to highest bidder. We reserve the right to accept or reject any bids that are made.

Item No.	Qty.		Price
1	1	104" Sheet cutter complete with stands for 10 rolls, and layboy. This is a Moore & White simplex cutter. Also has complete set of joggers for layboy. Have DC electrical equipment for above.	$4000.00
2	1	Daniel Rag Cutter #2—Complete with five cylinder Holyoke Duster.	$ 700.00
3	1	R40 Reducer, 12 to 1 ratio	$ 127.00
4	1	Slat Conveyor steel construction 4' wide, 3' high, 42' long, driven by one Jones Spur Gear Reducer, ratio 27 to 1, serial 10135. Driven by one Sprang Electric DC Motor type LC 10 HP 37.2 amp. 230 V. 180 RPM Ser. DL 2005213, complete with sheaves and V Belt drive, one Westinghouse Automatic Starter.	$ 425.00
5	1	John Waldron Corrugated & Embosser #711, 52"	$2000.00
6	1	Thorpe Hydraulic Press complete with 4 steam platen plates 40" x 40"	$2100.00
7	1	Viscolizer Pump for above press.	$1200.00

MISCELLANEOUS

8	2	Platform Scales.	$ 50.00
9		Paper Testing Equipment.	$ 250.00
10		Two-wheeled hand trucks.	$ 60.00
11	1	set—Black and Clawson Calender Stands complete with bearings and 8 rolls, 52" face.	$3150.00
12	1	set—Black and Clawson Calender Stands complete with 9 rolls, 108" face.	$3850.00
13	1	set—2 spool reels, vertical extension 9' 2" face.	$ 800.00
14	1	set—Vertical reels, 2 spool, 7' 2" face.	$ 600.00
15	1	Whiton Steam Turbine used for driving induced pressure fan for boiler. Whiton Turbine type BC, 2985 steam pressure 140 to 250 lbs., speed 1480, back pressure 7 lbs., HP 23 GOOD CONDITION.	$ 450.00

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CORES:

250 pcs.—6" I.D. 21½" long ½" wall—NEW
35 pcs.—6" I.D. 10" long ½" wall
160 pcs.—6" I.D. 24½" long 7/16" wall
110 pcs.—5" I.D. 30" long ½" wall
170 pcs.—5" I.D. cores 35½" long ½" wall
250 pcs.—Wooden cores 39" long 10" dia. 3¼" sq. hole.

CORES WITH STEEL ENDS 3" I.D. Hole

29 pcs.—21½"
17 pcs.—21"
19 pcs.—22½"
5 pcs.—28"
2 pcs.—24½"
3 pcs.—31½"
3 pcs.—28½"

CORES WITH STEEL ENDS 6" I.D. Hole

28 pcs.—40"
5 pcs.—63"

CORES:

3880 pcs.	1½" x 4	$24.00
2980 pcs.	1¼" x 5	18.00
2550 pcs.	1¼" x 6	15.00
976 pcs.	1¼" x 14	18.00
560 pcs.	1¼" x 10	6.50
773 pcs.	1¼" x 13	12.00
418 pcs.	1¼" x 25	16.00
2100 pcs.	1¼" x 9	24.00
218 pcs.	1¼" x 20	6.50
1730 pcs.	1¼" x 3	.80
2200 pcs.	1¼" x 1½	5.00
664 pcs.	1¼" x 18	14.00
300 pcs.	1¼" x 15	6.00
2275 pcs.	1¼" x 2	6.50
1125 pcs.	1¼" x 3½	5.35
650 pcs.	1¼" x 3¼"	4.00
2700 pcs.	1¼" x 2½"	10.00
6300 pcs.	1¼" x 1"	14.00
550 pcs.	1¼" x 8"	5.00
750 pcs.	1¼" x 5½"	4.20
475 pcs.	1¼" x 12	8.00
60 pcs.	1¼" x 36	3.00
575 pcs.	1¼" x 7	4.50
480 pcs.	1¼" x 2¼	1.50

ADDING MACHINE PLUGS:

25 bags—2 5/16" long 1⅛ O.D.—7/16" hole (950 per bag)
2 bags—standard size

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2 bags—1½" hole 2½ plug $5.00

TARENTUM PRODUCTS CORPORATION, Tarentum, Pa. **Contact Mr. J. V. Mason, Tarentum 1470**

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FOR SALE

FOR SALE

BEATERS
4—68 x 60 Holyoke iron tub
3—72 x 44 Noble & Wood, no tub
2—52 x 42 Downingtown, iron tub

CALENDERS (SUPER)
1—68" nine roll Holyoke, anti friction
1—55" nine roll Holyoke anti friction
1—56" nine roll Holyoke
1—52" seven roll Textile

CREPER
1—72" creping machine, five 42 x 73 dryers

CUTTERS
1—84" Clark with layboy
1—100" Dillon with layboy
1—72" Finlay with layboy
1—50" Finlay
1—60" Clark

DRIVES
1—Waterbury, size 10, type C
1—Waterbury, size 20, type C, rebuilt

DRYERS
1—36 x 154"
3—28 x 114"
4—36 x 108"
1—48 x 96"

ENGINES
2—Sturtevant V 57—10" x 9", 50 HP.

FOURDRINIER PARTS
1—110" Fourdrinier with three sets presses 109 x 20

GRINDER KNIFE
1—62" Seybold
1—45" Springfield

JORDAN
2—Union
2—Horne
1—Claflin No. 2
3—Brushes

HOT MELT SYSTEM
1—Wolverine

KETTLES & TANKS
2—300 gal. jacketed, 100 lb. pressure
1—75 gal. copper jacketed
3—
1—16 ft. dia. conical settling tank

PRESS PARTS
3—Sets 108" x 20" dia.
2—Sets 120" x 18"
2—Sets 150"

PULPER
1—No. 3 Lanneye
1—No. 1 Lanneye

PUMPS
1—10 x 12 Deane triplex rebuilt
1—⅝ x 6 Goulds triplex, hydraulic No. 41944
1—⅞ x 6 Deane triplex hydraulic

PUMPS (VACUUM)
1—Chicago pneumatic

RIFFLER
1—13, 14 and 15 ft. new system

SCREENS
2—No. 3A Bird
2—Moore & White No. 2
4—12 plate Packer flat
1—6 plate Packer
1—No. 2 Bird
1—Jones Leithwalk
2—12 plate
1—3 plate Valley

MOTORS
1—two cylinder Lancaster
1—three cylinder APMEW, moiud 50 x 100

SLITTERS AND WINDERS
1—150" Moore & White four drum
1—114" Kidder two drum

FRANK H. DAVIS CO., 175 Richdale Ave., Cambridge, Massachusetts TF

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Used converting equipment

1—Toilet interfolder 5¾"—"Z" fold.

1—Toilet interfolder 7" x 11"—double sheets.

1—Toilet embossing unit—99" trim.

For further details, inquire Box 47-396 care Paper Trade Journal. J-5

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co., Baltimore 30, Md. TF

FOR SALE—One Hudson Sharp Double Fold Inter Fold Toilet Machine, 40½" wide. All complete and ready to run. Address Box 47-381 care Paper Trade Journal. J-5

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FOR SALE—Experimental Laminating Machine 10" width, includes two floor roll stands, glueing and pressure applicator with two 5" Glue Rolls with pressure regulator. Also includes 10" capacity slitter and rewinder. Address Box 47-428 care Paper Trade Journal. J-5

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FOR SALE—Approximately one carload (12 tons) clean bleached, unprinted, new Waxing broke in bales located New York State. Advise best offer. Address Box 47-429 care Paper Trade Journal. J-12

WANTED

WANTED

2 Asphalt Laminators
(one 36" to 60")
(one 60" or over)

Also rewinders and slitters for asphalt duplex material.

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SLITTER WANTED—48" to 60" wide Cameron Slitter #2A or comparable machine. Give all details concerning cutting equipment and price. Address Box 47-421 care Paper Trade Journal. J-12

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WANTED—Brightwood Box Machine. Address Box 47-71 care Paper Trade Journal. TF

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MISCELLANEOUS

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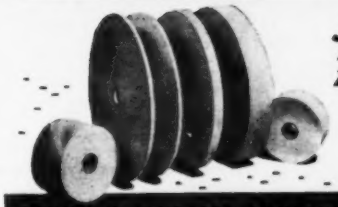

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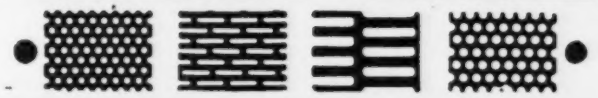

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NOW: FOUR SIZES

No. 0, No. 1, No. 2, No. 3

ALSO: TAPPI STANDARD PULP TESTING, SHEET MAKING APPARATUS

THE HERMANN MFG. CO.

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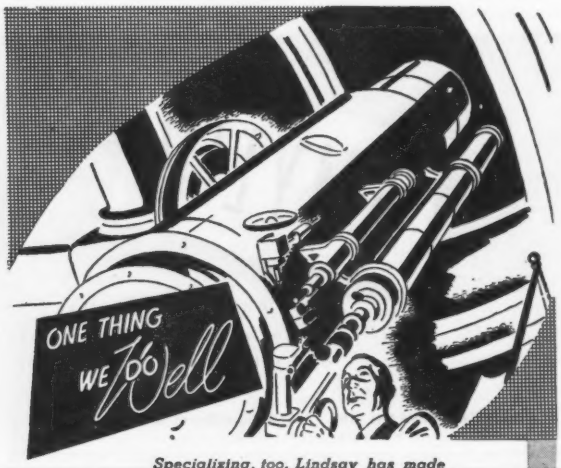

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Raybestos-Manhattan Inc. Manhattan Rubber Division
Shartle Brothers Machine Co.
SKF Industries, Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Wood's Sons Company

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Black-Clawson Company
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Downingtown Mfg. Co.
Hermann Mfg. Co.
E. D. Jones & Sons Co.
Morden Machines Co.
Noble & Wood Machine Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

BED PLATES
Bahr Brothers Mfg. Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Lukenweld, Inc.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BELTING
Alexander Brothers
Allis-Chalmers Mfg. Co.
Link Belt Company
Raybestos-Manhattan Inc. Manhattan Rubber Division
J. E. Rhoads & Sons
United States Rubber Co.
T. B. Wood's Sons Company

BLADES
Simonds Saw & Steel Co.

BLEACHERS
Improved Paper Machy. Corp.

BLEACHING BOILERS, ROTARY
The Biggs Boiler Works Co.

BLEACHING APPARATUS
The Biggs Boiler Works Co.
Improved Paper Machy. Co.
E. D. Jones & Sons Co.
Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Roderick O'Donoghue
Pennsylvania Salt Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Kalamazoo Tank and Silo Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
Biggs Boiler Works
Foster Wheeler Corp.

BOTTOMS
Harrington & King Perforating Co.
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

CALENDERS
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Lobdell Co.
Moore & White Co.
Perkins & Sons, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Casein Co. of America, Division of The Borden Co.
Hercules Powder Co., Inc.

CASTINGS
Appleton Machine Co.
Black-Clawson Company
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Grinnell Company
Hamblet Machine Co.
E. D. Jones & Sons Co.
Link Belt Company
Lobdell Co.
Magnus Metal Corp.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.
Walworth Company

CAUSTIC SODA
Pennsylvania Salt Co.

CENTRIFUGAL MACHINERY
Bird Machine Co.
De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp.
Ross, J. O., Eng. Co.
Shartle Brothers Machine Co.
Williams Apparatus Co.

CHAINS
Link Belt Company

CHEMICALS
American Anode, Incorporated
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
Calgon, Inc.
The Cowles Detergent Company
Diamond Alkali Co.
Dispersion Process, Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuffs Corp.
Geigy Co., Inc.
Gottesman & Co.
Hooker Electrochemical Company
The Kinsley Chemical Company
Mallinckrodt Chemical Works
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
Nopco Chemical Co.

TO BUY

Naugatuck Chemical Div. of U. S. Rubber Co.
Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Company
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
United States Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CHESTS
Kalamazoo Tank and Silo Co.

CHLORIDE OF LIME
Pennsylvania Salt Co.

CLAY
A. M. Meincke & Sons Inc.

CLEANERS
Adell Chemical Company

CLEANING MATERIALS
Adell Chemical Company
Amer. Cyanamid & Chem. Corp.
Bird Machine Co.
The Cowles Detergent Company
The Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department Hercules Powder Co.
Monsanto Chemical Co.
Nichols Engrg. & Research Corp.
Oakite Products, Inc.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
Black-Clawson Company
Hudson Sharp Machine Company
Farrel-Birmingham Co.
Rodney Hunt Machine Co.
Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
T B. Wood's Sons Company

COATING MACHINERY
Gibbs-Brower Company, Inc.
Hudson Sharp Machine Company
Mayer Machine Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corporation, John
Weber, Herman G.

COATING MATERIALS
American Anode Div., The B. F. Goodrich Chem. Co.
Dennis Chemical Company

COLORS
Chemical & Pigment Division, The Glidden Company
C. K. Williams & Co.

COMPOUNDED LATICES
American Anode Div., The B. F. Goodrich Chem. Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.

CONDENSERS
Foster Wheeler Corp.

CONSULTING ENGINEERS
Frederic C. Clark Associates
Ferguson, Hardy S.
Hardy, George F.
Alvin H. Johnson & Co., Inc.
The Kohler System Company
Main, Inc., Chas. T.
The MacPherson Company
Roderick O'Donoghue
The Rust Engrg. Co.
J. E. Sirrine & Co.
South Wabash Engrg. Co.
Stone & Webster Engrg. Corp.

CONTROLLERS
Black-Clawson Co.
Cochrane Corp.

CONTROLS
The Bristol Company
Cochrane Corp.
Harry W. Dietert Company
Stickle Steam Specialties Co.
Westinghouse Electric Corporation

CONVEYORS
Black-Clawson Company
Link Belt Company
Murray, D. J., Mfg. Co.
Ross Engineering Corp., J. O.

COOKING PROCESSES
The Kinsley Chemical Company

COOLING SYSTEMS
Foster Wheeler Corp.

CORES
Elixman Paper Co.
Rodney Hunt Machine Co.
Smith & Winchester Mfg. Co.
Sonoco Products Co.
Walker-Goulard-Plehn Co.

COUPLINGS
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Link Belt Company
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
T. B. Wood's Sons Company

CRANES
Link Belt Company

CUTTERS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Perkins & Son, Inc., B. F.
Simonds Saw & Steel Co.
The Smith & Winchester Mfg. Co
South Wabash Engrg. Co.
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Raybestos-Manhattan Inc., Manhattan Rubber Division
Valley Iron Works Co

DEASPHALTING CHEMICALS
Adell Chemical Company

DECKERS
Improved Paper Machy. Corp.
Oliver United Filters, Inc.

DECKLE STRAPS
Stowe Woodward, Inc.

DE-INKING
Adell Chemical Company
Dilts Machine Works
Kinsley Chemical Co.
Roderick O'Donoghue
Shartle Brothers Machine Co.

DEINKING CHEMICALS
Adell Chemical Company
Philadelphia Quartz Co.

DETERGENTS
Adell Chemical Company
Cowles Detergent Co.
Philadelphia Quartz Co.

DEWAXING CHEMICALS
Adell Chemical Company

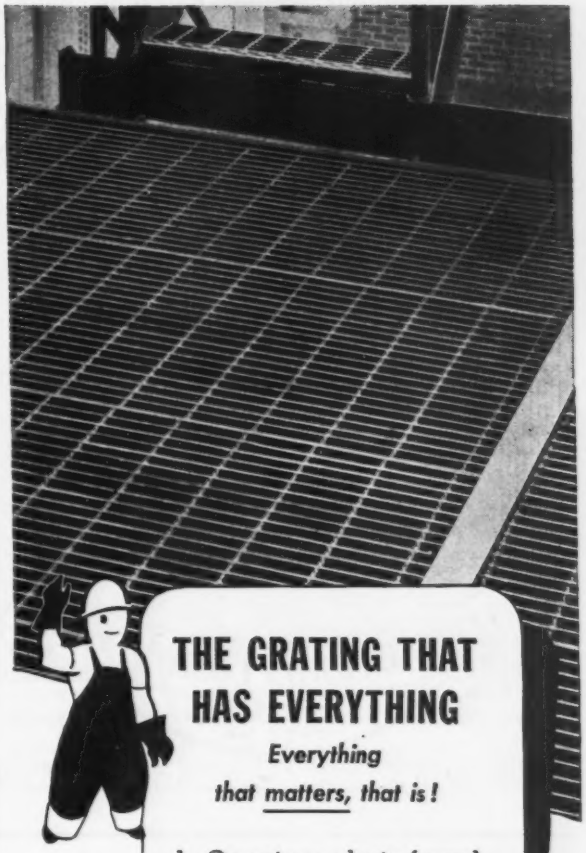
DIGESTERS
Biggs Boiler Works Co.
Foster Wheeler Corp.
General American Transportation Corp.
Pusey & Jones Corp.

DISPERSING AGENTS
Adell Chemical Company
New York Color & Chemical Co.

DOCTORS
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Co.
Lodding Engineering Corp.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
Lodding Engrg. Corp.
Raybestos-Manhattan Inc. Manhattan Rubber Division
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Simonds Saw & Steel Co.
United States Rubber Co.

DRIERS
Black-Clawson Company
Gibbs-Brower Company, Inc.
Lukenweld, Inc.
Murray Mfg. Co., D. J.
J. J. Ross Company



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Everything that matters, that is!

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4. Self-cleaning—no sharp corners to clog with dirt!
5. Economical and easy to install—wherever and whatever your grating needs!

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of Blaw-Knox Company
2119 Farmers Bank Bldg., Pittsburgh 22, Pa.

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ELECTROFORGED STEEL **GRATING**

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Carbon blacks for all paper and board stocks—outstanding soft texture, particle fineness and jet black color. Takes well to the fiber, shows high retention.

Best for performance in the Beater and Jordan because of ease of wetting and ready dispersion in the furnish.

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CANADIAN
INDUSTRIES, LIMITED

PRICE &
PIERCE, Ltd.

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PAPER AGENTS

for domestic and export

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The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Gibbs-Brower Company, Inc.
Rodney Hunt Machine Co.
Link Belt Company
Moore & White Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Westinghouse Electric Corporation
Valley Iron Works Co.

DRYER DRAINAGE
Stickle Steam Specialties Co.

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.
C. K. Williams & Co.
Witco Chemical Co.

EMBOSSING ROLLS
Gibbs-Brower Company, Inc.
Northern Engraving & Mch. Co.
Roehlen Engraving Works

EMULSIFIERS
Adell Chemical Company

EVAPORATORS
Black-Clawson Company
Foster Wheeler Corp.
General American Transportation Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

FABRICATED PIPING
Crane Company

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Merrick Scale Mfg. Co.
Leeds & Northrup
Milton Roy Pumps
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co., Ins.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.

FELT CLEANERS
Adell Chemical Company
The Cowles Detergent Company

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Waldron Corp., John

FIBRILATORS
Paper & Ind. Appliances

FILES
Simonds Saw & Steel Co.

FILLERS
A. M. Meincke & Son Inc.
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Johns-Manville Sales Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Cochrane Corp.
General American Transportation Corp.
Improved Paper Machy. Corp.
Moore & White Co.
Oliver United Filters, Inc.
J. O. Ross Engrg. Corp.
Witco Chemical Co.

FITTINGS, PIPE
Crane Company
Walworth Company

FLOORING, GRATING & TREADS
Norton Co.
Raybestos-Manhattan Inc., Manhattan Rubber Division
United States Rubber Co.

FORMATION TESTER
Thwing-Albert Instrument Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters, Inc.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

FRICTION MATERIALS
Johns-Manville Sales Corp.
Raybestos-Manhattan Inc., Manhattan Rubber Division

FREENESS TESTERS
Testing Machines, Inc.
Williams Apparatus Co.

GASKETS
Raybestos-Manhattan Inc., Manhattan Rubber Division

GEARS
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John
Westinghouse Electric Corporation

GRINDERS
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Wks.

GRINDING WHEELS
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc
Norton Company
United States Rubber Co.

HEADS
Lukens Steel Company

HEAT EXCHANGERS
Foster Wheeler Corp.
Stickle Steam Specialties Co.
Westinghouse Electric Corporation

HEAT RECOVERY SYSTEMS
Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Cochrane Corp.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.

TO BUY

HOSE (Air, Water, Suction, etc.)
Raybestos-Manhattan Inc.
Manhattan Rubber Division
United States Rubber Co.

HUMIDITY CONTROL
Harry W. Dietert Company

HYDRAPULPERS
Dilts Machine Works
Shartle Bros. Machine Co.

IMPREGNANTS
American Anode Div.,
The B. F. Goodrich Chem. Co.

INDUSTRIAL TRACTORS
Towmotor Corp.

INSTRUMENTS, TESTING AND MEASURING
Ames Company, B. C.
The Barbour Stockwell Co.
Bauer Brothers Co.
N. P. Bowsher
The Bristol Company
Cochrane Corp.
The Foxboro Company
General Electric Company
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taylor Instrument Cos.
Thwing-Albert Instrument Co.
Testing Machines, Inc.
Wallace & Tiernan Instrument Co.
Williams Apparatus Co.
Westinghouse Electric Corporation

JOINTS
Perfecting Service Company

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KNOTTERS
Improved Paper Machy. Corp.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Bigga Boiler Works Co.
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Taylor Instrument Companies
Testing Machines, Inc.
Thwing-Albert Instrument Co.
Valley Iron Works Co.
Williams Apparatus Co.

LAY BOYS
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers Machine Co.

LINTER COTTON
The Railway Supply & Mfg. Co.

LIQUID CHLORINE
Pennsylvania Salt Co.

LITHOPONE
Chemical & Pigment Division,
The Glidden Company

LUBRICANTS
Gulf Oil Corporation
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

MATERIAL HANDLING
Automatic Transportation Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Co.
Testing Machines, Inc.
Walker-Goulard-Plehn Co.

MOISTURE CONTENT CONTROL
Harry W. Dietert Company
Stickle Steam Specialties Co
Williams Apparatus Co.

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Thwing-Albert Instrument Co.
Westinghouse Electric Corporation

NOZZLES
Link Belt Company

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Div.
of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Bagley & Sewall Co.
Black-Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lukenweld, Inc.
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
The Sandy Hill Iron & Brass Wks.
Valley Iron Works Co.

PAPER MILL BUILDERS
The Rust Engrg. Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
South Wabash Engrg. Co.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corp., John

PENSTOCKS, WELDED STEEL
The Bigga Boiler Works Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.

pH METER
Thwing-Albert Instrument Co.

PIPE
Black-Clawson Company
Crane Company
Grinnell Company
Johns-Manville Sales Corp.
Stowe-Woodward, Inc.
Walworth Company

PIPE FITTINGS
Crane Company

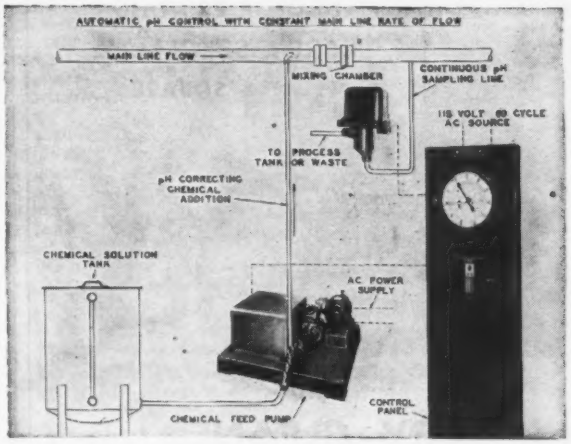
PIPING, FABRICATED
Crane Company

PLATERS
Gibbs-Brower Company, Inc.
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
J. O. Ross Engrg. Corp.
Lukens Steel Company
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLATE WORK (Steel & Alloy)
The Bigga Boiler Works Co.
Lukenweld, Inc.

MILTON Roy PUMPS


AUTOMATIC pH CONTROL WITH CONSTANT MAIN LINE RATE OF FLOW
MAIN LINE FLOW
MIXING CHAMBER
CONTINUOUS pH SAMPLING LINE
115 VOLT 60 CYCLE AC SOURCE
TO PROCESS TANK OR WASTE
pH CORRECTING CHEMICAL ADDITION
CHEMICAL SOLUTION TANK
AC POWER SUPPLY
CONTROL PANEL
CHEMICAL FEED PUMP

CONSIDER *Automatic* CONTROLS

- ***for your water treatments***
- ***for pulp preparation pH control***
- ***for handling slime control chemicals***

More and more are modern chemical treating methods being utilized in the manufacture of paper . . . to obtain better and more uniform quality and to lower production costs.

We have supplied the industry with many Milton Roy Pumps to chemically treat raw water, for pH control in beaters, to handle slime control chemicals, soda ash, lime, alum, and hypochlorites, resins, sizings, coatings, dyes etc.

For such applications we now offer equipment that carries chemical treatments one further step toward perfection . . . Milton Roy Pumps with Fully Automatic Electronic Controls, to handle all treating chemicals, in exact proportion to predetermined requirements, in quantities as small as 1 pint per hour to as much as 23 gallons per minute per pump side.

For details see our new catalog No. 146 and Technical Paper No. 54, "Electronics in Automatic Chemical Feed Systems."

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1376 E. MERMAID AVE., CHESTNUT HILL, PHILA. 18, PA.

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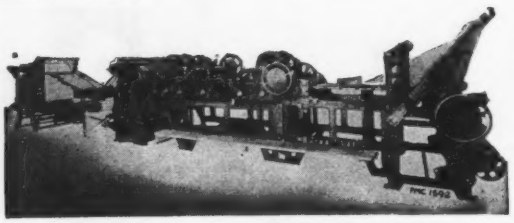
2-COLOR PRINTING
LARGE SPECIALTY
FLAT & SQUARE



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DRY CLEANER PAPER BAG MACHINE

POTDEVIN High-Speed Paper Bag Machinery, Aniline and Oil Ink Printing Presses.

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High Grade Coated Book

●

Kraft Converting and Kraft Envelope
Kraft Liner Board

●

Mills:

Mechanicsville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

WHERE

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

POWER TRANSMISSION MACHINERY
Link Belt Company
Westinghouse Electric Corporation

PRECISION SAMPLE CUTTER
Thwing-Albert Instrument Co.

PRESERVATIVES
American Lumber & Treating Co.
E. I. Du Pont de Nemours & Co.
Koppers Company, Inc.

PRESSURE VESSELS, STEEL AND ALLOY
The Biggs Boiler Works Co.
General American Transportation Corp.
Foster Wheeler Corp.

PRESSES
Black-Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John
Weber, Herman G.
Williams Apparatus Co.

PULP CLASSIFIER
Thwing-Albert Instrument Co.

PULP STOCK VALVES
Crane Company

PULPERS
Bauer Brothers Co.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Lyddon & Co., (America) Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Buffalo Pumps, Inc.
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Gibbs-Brower Company, Inc.
Goulds Pumps Inc.
Ingersoll-Rand Co.
Johnson Corp.
Milton Roy Pumps
Moore & White Co.
Morris Machine Works
Nash Engineering Co.
Noble & Wood Machine Co.
Oliver United Filters, Inc.
Paper Converting Mch. Co.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
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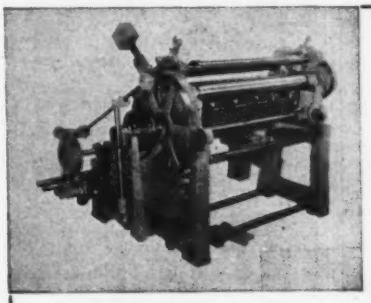

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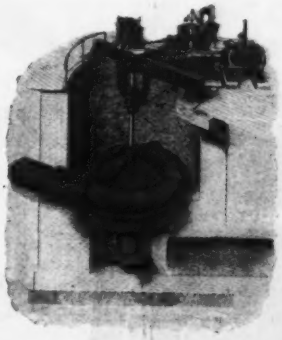

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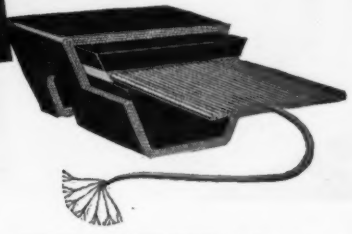

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CALENDAR OF COMING EVENTS

June 11-13, 1947—Canadian Pulp and Paper Association, Technical Section, Summer Meeting. Hotel Algonquin. St. Andrews-by-the-Sea, N. B.

June 13-14, 1947—Maine-New Hampshire TAPPI Section Meeting, Poland Spring, Me.

June 16-17, 1947—American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hotel, Atlantic City, N. J.

June 20-21, 1947—Paper and Twine Association, Annual Meeting, French Lick Springs Hotel, French Lick Springs, Ind.

September 3-6, 1947—TAPPI Fundamental Research Meeting, Appleton, Wis.

September 24-27, 1947—TAPPI Acid Pulping Meeting, Minneapolis, Minn.

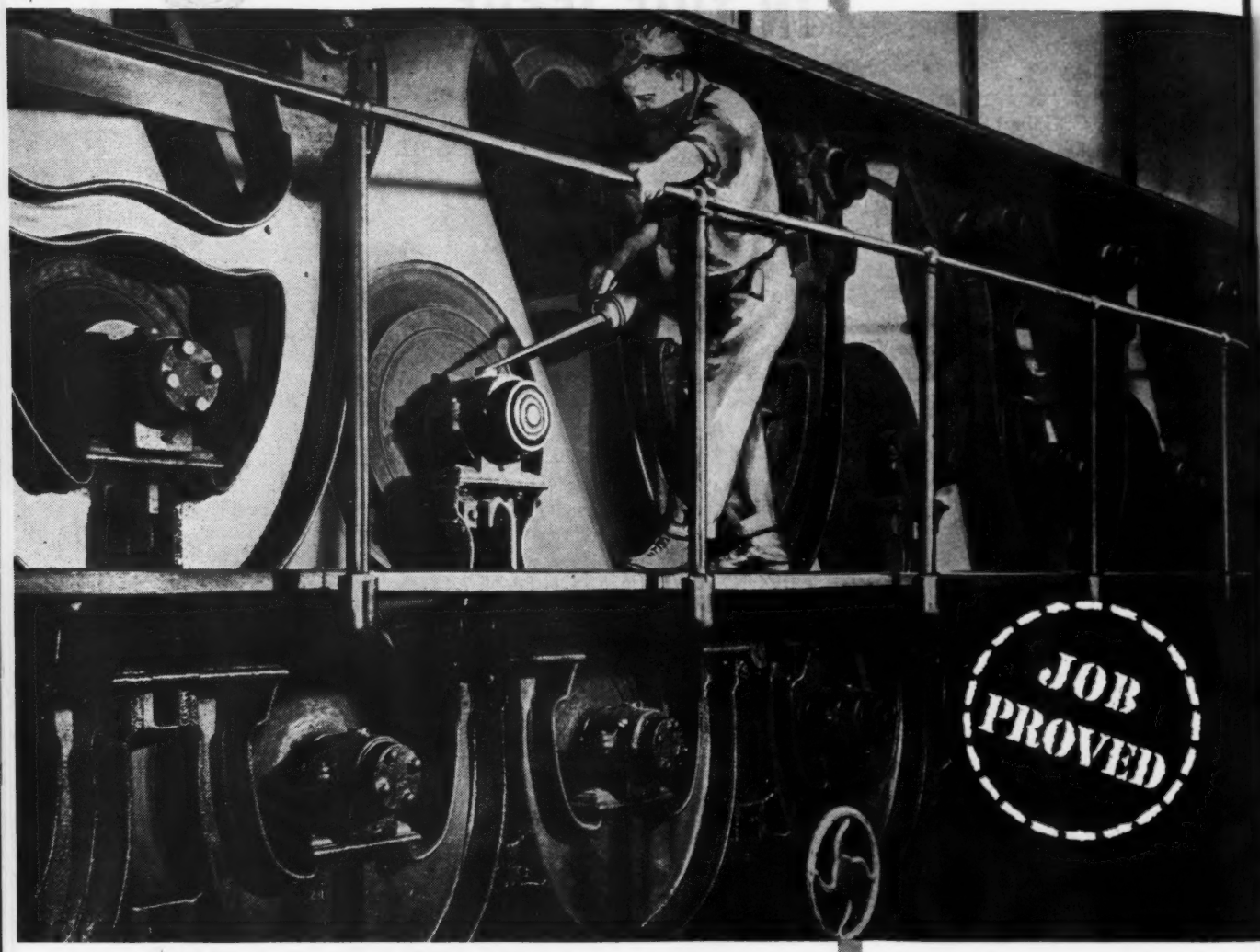
October 9-11, 1947—TAPPI Alkaline Pulping and Chemical Products Meeting, Asheville, N. C.

October 27-29, 1947—The National Paper Trade Association of the U. S., Inc., Semi-annual Convention, Hotel Sherman, Chicago.

November 3-5, 1947—TAPPI Second Engineering Conference, Philadelphia, Pa.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

Ends Chronic Bearing Trouble



SUN PAPER MILL LUBRICANT...

Eliminates Need for Frequent Dismantling

A big mill, making paperboard, was being slowed down by lubrication trouble on the drier rolls. Carbon accumulated regularly in the ring-oiled bearings, causing the rings to stick. As a result of improper lubrication, power consumption increased. The bearings had to be dismantled frequently. Meanwhile production stopped and maintenance costs piled up.

A Sun Engineer recommended a lubricant that had been "Job Proved" in dozens of paper mills. With this oil the trouble stopped and carbon practically disappeared.

A labor saving of about 500 man-hours per year, plus an annual saving of $320 on oil, has resulted, and more continuous production has been possible. This is a typical example of how Sun Paper Mill Lubricants keep production up and costs down.

For all types of paper-making machinery and other equipment, your Sun Engineer has "Job Proved" lubricants. For full information call your nearest Sun Office. Or write Department PT-6.

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